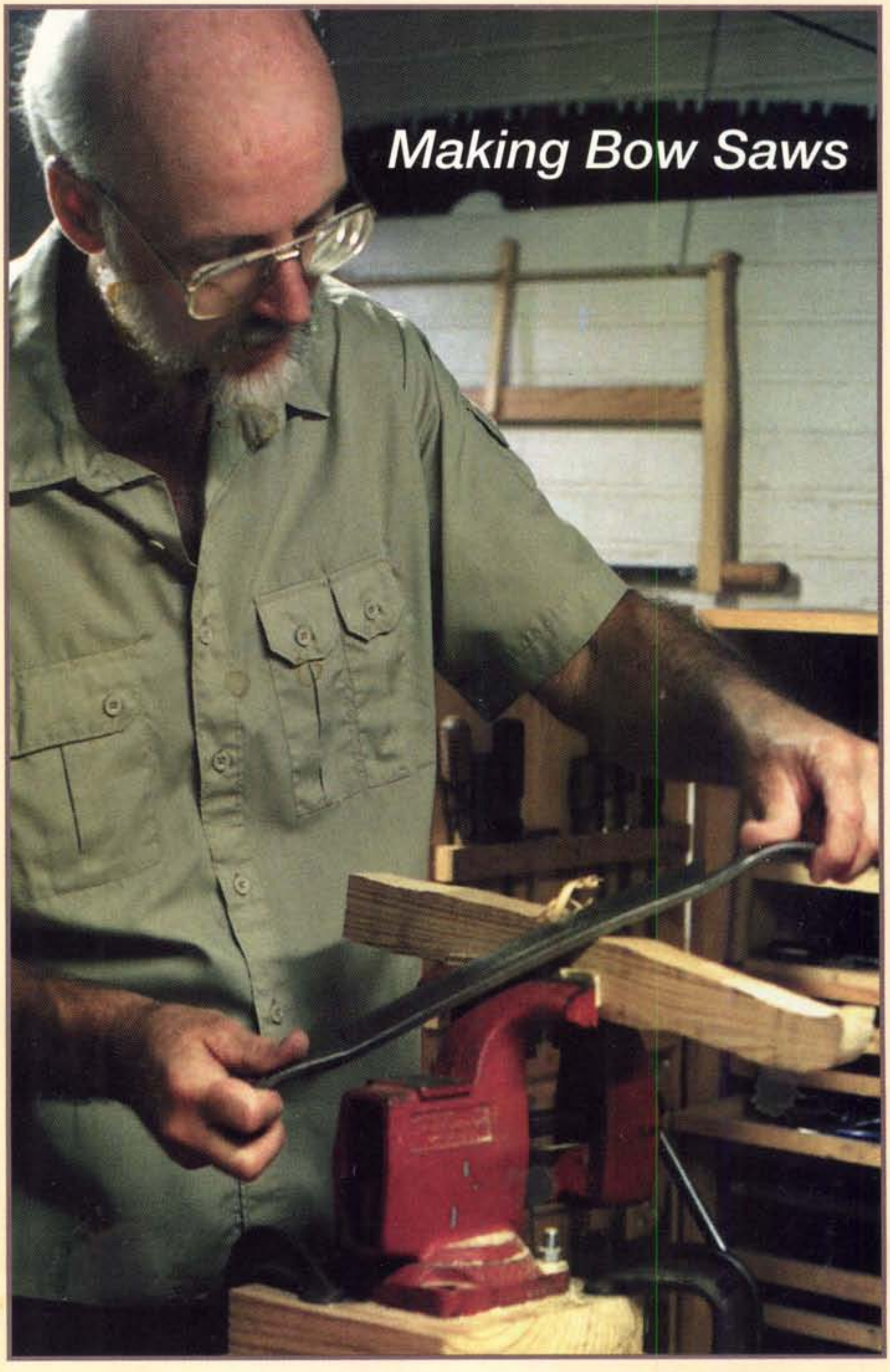
BIG (21" X 32") ullOut™ Plans

Display until August 1

Popular Woodworking

Issue #73 July 1993

A Simple Cabinet • Puzzle Chair • CD Case • Fantasy Bird House • Dashing Dan Whirligig



Making Bow Saws

US $4.50 Canada $5.50

07

0 71486 01355 6

New Features This Issue:

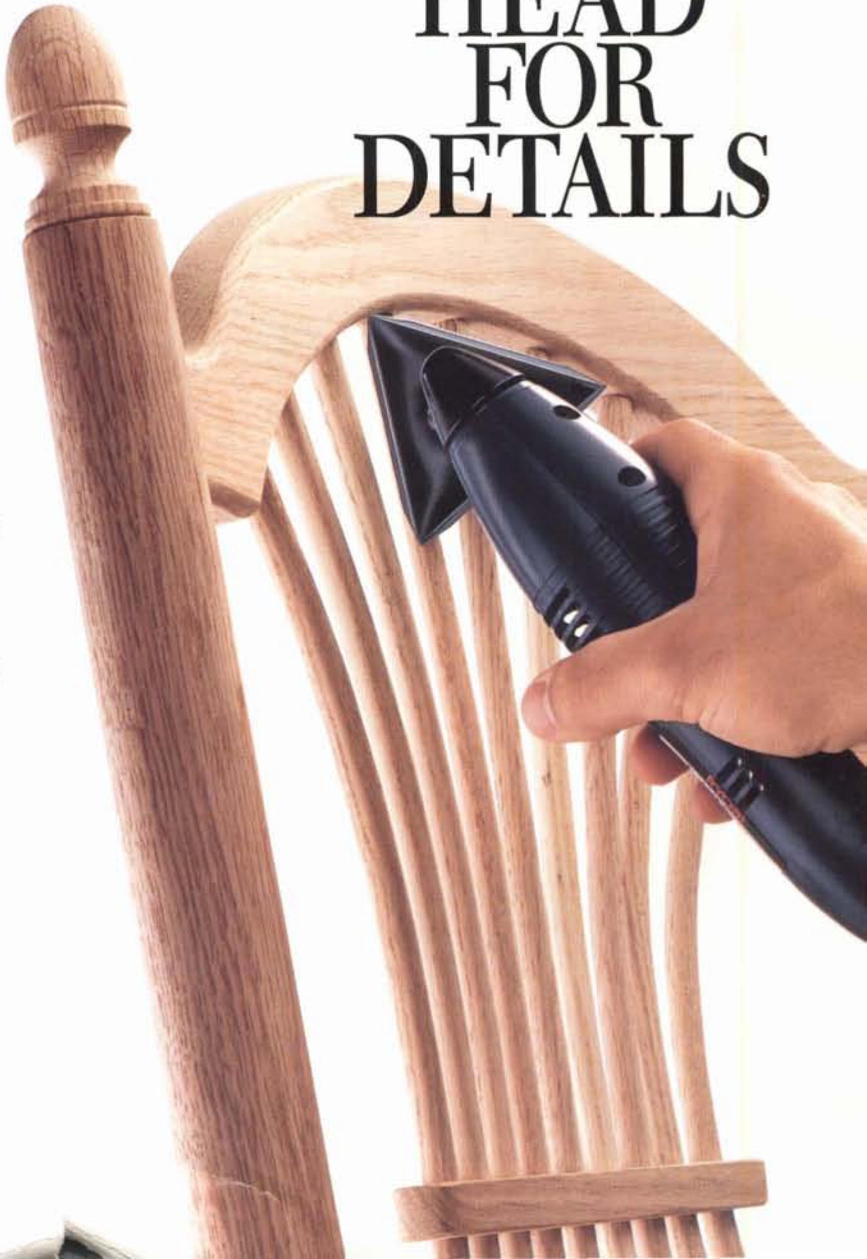
The Tool Wright's Corner

Caption The Cartoon Contest

Corners. Nooks. Crannies. Notches. The powerful new Ryobi Detail Sander takes care of all your sanding details. Its triangular head gets into places other sanders can't reach. And its oscillating action produces extra fine finishes, virtually eliminating finger sanding.

Optional add-on accessories turn this versatile tool into even more of a small wonder. Besides sanding, you can use the Detail Sander for removing light rust from intricate surfaces – like ornamental wrought iron furniture and railing – with the Metal Finishing Pad. Remove paint and adhesive from glass and wood easily with the Scraper Blade. Wax and polish tight spots and angles with the Wax/Buffing Pad; ideal for car detailing.

A
HEAD
FOR
DETAILS



Remove paint and varnish from hard-to-reach surfaces easily with the Stripping Pad. Or smooth bare wood and prepare newly painted surfaces between finish coats with the Finishing Pad.

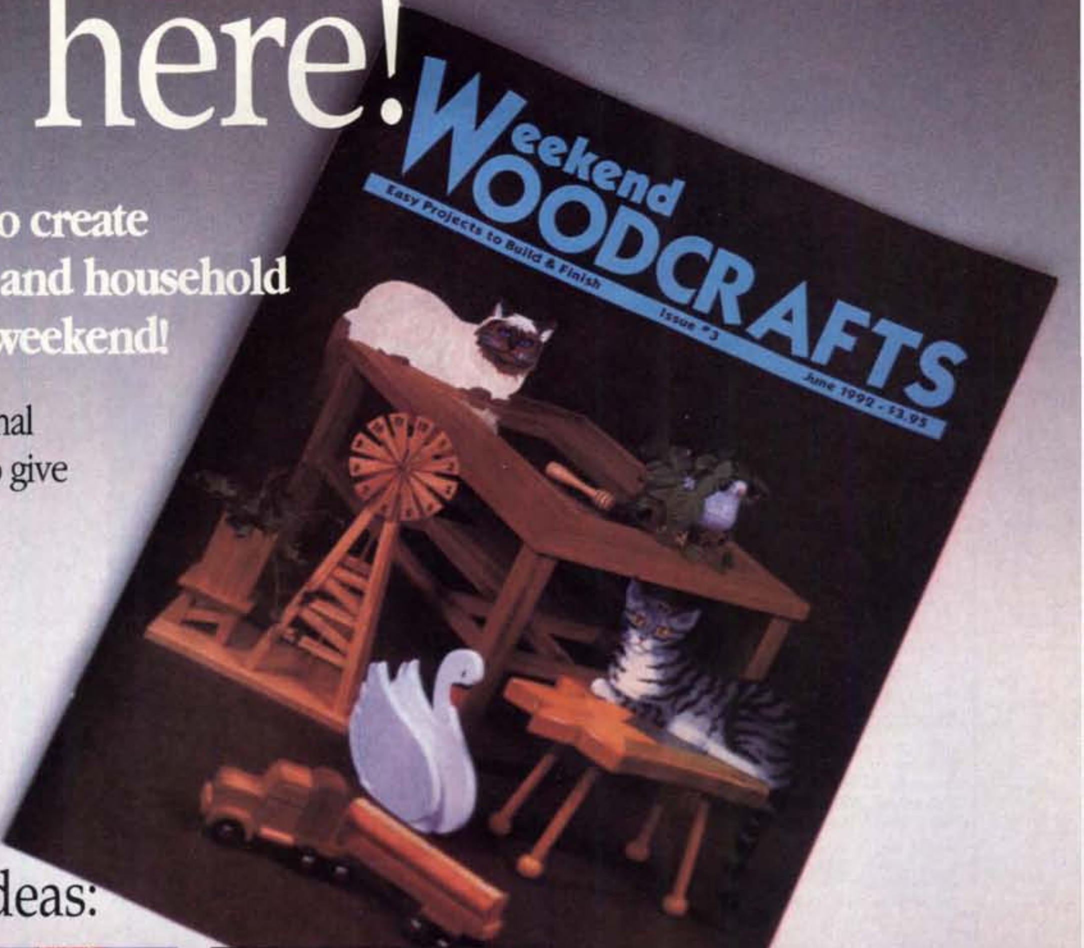
The Ryobi Detail Sander. It's fast, versatile and easy to use. For even more details, stop by your Ryobi dealer today or call 1-800-525-2579.

Made in USA by Ryobi

RYOBI®
Making Innovative Concepts A Reality™

Ryobi America Corp., 5201 Pearman Dairy Road, Suite 1,
Anderson, SC 29625-8950
© Ryobi America Corp. 1992

Great gift ideas start here!



Use your talents to create inexpensive gifts and household items in a single weekend!

Nothing beats the personal touch when you want to give a gift of lasting value.

FULL-SIZED PullOut™ Plans make it easy!

Step-by-step photo instructions make it fun!

Some of our great project ideas:

Countertop Bread Box

Memory Center

Child's Play Table

FREE COPY!

We would like to send you a trial copy of **Weekend Woodcrafts.** If you like it, you'll receive a total of 6 great issues for only $14.97. That's 30% OFF the cover price. If you don't, just return the bill marked -CANCEL- keep the first issue FREE.

YES! I would like to take advantage of this trial offer. Send me my trial copy of **Weekend Woodcrafts.**

Name ______________________________

Address ______________________________

City ______________ State ________ Zip ________

Send to: Weekend Woodcrafts, Dept. 5MJN5, Box 59006, Boulder, CO80322-9006

Popular Woodworking

Editor Robert C. Cook
Associate Editor Benjamin Green
Assistant Editors Tom Larson
Margo Lemas
Sharon Mikkelson
Editorial Assistants Michael Cain
Bryan Layton
Glenda Gil
Contributing Editors Alan Marks
Hugh Foster
John A. Nelson
Don Kinnaman
Ken Sadler
Ken Textor
Sanford Wilk
Photo Editor Allen Shain
Photo Assistant Kim Gentzler
Art Department Ginny Pruitt
Keri Lindstrom
Robert Chapla
Circulation Mary Goldthorpe
Harold Radin

Customer Service 510-671-9852
May Fayne, Kimberly S. Lillig
Advertising Manager Brian Kapanoske
Advertising Assistant Kimberley Matthews
(510) 671-9852 Fax (510) 671-0692
Classified Department Suzanne Eriksen
Eastern Account Manager Tony Hill
(201) 488-7900 Fax (201) 489-4609

Popular Woodworking (ISSN 0884-8823) is published bimonthly by EGW Publishing Co., 1041 Shary Circle, Concord, CA 94518. Second-class postage paid at Concord, California and additional mailing offices. POSTMASTER send address changes to *Popular Woodworking*, Box 58279, Boulder, CO 80322-8279.

SUBSCRIPTIONS: A year's subscription (6 issues) is $27; two years' worth (12 issues) is $54; outside of U.S.A. add $6.00/year. Send to: *Popular Woodworking*, Box 58279, Boulder, CO 80322-8279. Please allow 6 to 8 weeks for delivery.

All rights reserved. Reproduction without prior permission is prohibited. Copyright ©1993 by EGW Publishing Co.

Unsolicited manuscripts, photographs, artwork and other materials are accepted, but *Popular Woodworking* cannot assume responsibility for these materials. Writers who submit articles do so with the understanding that the work is original and done by them. The author warrants that submissions and subsequent printing of any materials in *Popular Woodworking* magazine do not infringe upon the rights of any third party and agrees to be totally liable for such claims. Submissions must be accompanied by a self-addressed, stamped envelope for return. Address all editorial correspondence to: *Popular Woodworking*, 1041 Shary Circle Concord, CA 94518.

The opinions expressed by the authors do not necessarily reflect the policy of *Popular Woodworking*. Editorial correspondence is encouraged, and may be edited for publication.

Advertisers and agencies assume complete liability for the copy in their advertisements and warrant that it does not infringe on the copyrights or trademarks of others. Advertisers and agencies agree to hold publisher harmless from any liabilities arising out of such infringement and to reimburse publisher for any and all expenses and costs incurred by publisher by reason of such infringement.

Canadian GST Reg. #R127573087
Produced and printed in the U.S.A.

EGW Publishing Company
President Wayne Lin
Operations Manager John Dixon
Editorial Director David M. Camp
Executive Editor Phil Fischer

Contents

Sometimes poor Bob just can't come up with a caption! Help him out— see page 97.

On the Cover

Bob Laney is a man for all seasons. His wife Elaine describes him as a writer–woodworker, musician and mountain man—your basic Renaissance man. In his spare time he's a technician for a nuclear pharmaceutical company. Bob designed and made the bowsaws featured on page 62. He sent us the saws so we could photograph them and I had a chance to try them out. They're a pleasure to use and I think you'll enjoy building them.

Issue #73, July 1993 Volume 13, Number 1

Techniques
Loft a Duck *by Garth Graves* 26

A Popular Woodworking Project
A Simple Cabinet© *by Ken Sadler* 30

A Popular Woodworking Project
Making Pine Burl Tables *by H.B. Roholt* 35

A Popular Woodworking Project—**PullOut**™ **Plans**
Colonial Handkerchief Table *by Robert L.Elmore* 38

A Popular Woodworking Project—**PullOut**™ **Plans**
Puzzle Chair *by Devore Burch* 59

A Popular Woodworking Project—**PullOut**™ **Plans**
Fairy Tale Birdhouse *by Don Kinnaman* 60

A Popular Woodworking Project—**PullOut**™ **Plans**
Making Bow Saws *by Bob Laney* 62

A Popular Woodworking Project
A Toddler's Toybox *by Carl Dorsch* 66

The Mallet
Relief Carving–Flowers and Leaves *by Jack Ekstrom* 68

A Popular Woodworking Project—**PullOut**™ **Plans**
Dashing Dan *by Gabriel Zuckerman* 72

A Popular Woodworking Project
Compact Disc Storage Case *by Jeff Greef* 76

Tool Talk
3/8" Corded Drills *by Sanford Wilk* 86

Wood Types
Mesquite *by Ken Textor* 92

Columns

Finishing Forum 12
Book Reviews 15
Back Issues 16
Tried and True 18
The Business End 22
The Tool Wright's Corner 82
Out of the Woodwork 98

Departments

Turnings/Letters 6
Tricks of the Trade 8
News & Notes 84
Classified 94
Index to Advertisers 95
Calendar 96
Caption the Cartoon 97

Turnings

Things keep turning...I've got a 12" piece of a mesquite log on the lathe that Howard French sent me–what a great wood to turn. I'm saving all the shavings for the smoker. Take a look at Wood Types on page 92 for the lowdown on this starkly beautiful tree.

There are two new items in this issue I hope you enjoy: Bob Rech, whose cartoons often appear in *Out of the Woodwork*, sent me a 'toon without a caption. We thought it would be a lot of fun to see what you readers could come up with. From the letters and calls I get, I know some of you have a sense of humor. Anyway, I asked DeWalt if they'd be willing to give away one of their new biscuit joiners to the winner, and they've agreed to sponsor the contest for the next six issues. I know there will be some tough calls, so I'll toss in a one year subscription for the two runners up. August 1st is the cutoff for the first contest!

The other item is a new column titled *The Tool Wright's Corner*. I view my position as consisting of many roles. There's the production aspect–making a book every other month. (I get a lot of help from a great bunch of talented people.) Another role involves the interaction between advertisers, marketing and you readers. *Tool Talk* has been known to stir-it-up (see *Letters*). But more important is my job to bring ideas forward for you (and me) to explore. Old dogs not withstanding, learning something we didn't know before is what keeps us alive, or at least interesting as people. With that in mind, I've invited several of the manufacturers to teach us about their products, different aspects of their business or other items that might be of interest. The guidelines I've laid down for them include: no blatant "chest beating," no competition bashing, and most important, teach us something we didn't know before. So take a look at *The Tool Wright's Corner* on page 82 and let me know what you think.

I don't own the monopoly on great ideas, so if there's a topic you'd like to have one of the toolmakers explain, turn it over in your mind, shoot the idea my way and I'll see what I can do.

Have a safe 4th of July.

Rob

Note to a fellow woodworker: Harrison, if you're out there, send us a project or photo—we'd like to see what you're building in your spare time.

Safety Note

Safety is your responsibility. The manufacturers place safety devices on their equipment for a reason. In most of the photos you see in *PW* these have been removed to provide clarity. In some cases we'll use an awkward body position so you can better see what's being demonstrated. Please don't copy us. Think about each procedure you're going to perform beforehand. Think ahead.

Letters

We welcome your comments, pro or con, about articles we publish. Send your letters to: Editor, Popular Woodworking, 1041 Shary Circle, Concord, CA 94518. Letters may be edited for publication.

Sour Grapes or Stupid Readers?

I read with much surprise and dismay your articles in the January and May issues regarding the Readers' Choice Awards.

Much independent research has been conducted on behalf of MILWAUKEE ELECTRIC TOOL, which completely refutes the information you have published.

MILWAUKEE and Makita, for example, have been consistently rated superior to all other manufacturers when evaluating dependability, durability, and customer acceptance. Both rate substantially higher than all others in terms of awareness, as well.

You elected to rate DEWALT, an unproven product, on the market less than one year, as best without even evaluating the two top selling brands—makes no sense whatsoever!

Making even less sense was your choice of DEWALT'S biscuit joiner, which cannot even be found yet on the market. How can a completely new tool barely on the market be rated the reader's best?

There is nothing wrong with responsible evaluation of products. If proper preparation, research and planning is conducted, the information can be very helpful to readers. However, when a thorough investigation of the issue is not made, your reader is shortchanged, and the manufacturer could be unjustifiably hurt. Then, of course, there is the reputation of the publication to consider.

Companies like MILWAUKEE, BOSCH, MAKITA and others have invested many years and much money designing and manufacturing high quality products, while building solid reputations.

As editor, you have ultimate responsibility to provide your readers accurate, unprejudiced information, while protecting the good names of high quality manufacturers. That is responsible journalism, and apparently misdirected in the case of these articles.

Terry Thomas
Vice President
Andrews/Mautner, Inc.

The Readers' Choice Awards are the tool industry's equivalent to what goes on in the motion picture business with the Academy Awards. For a manufacturer to have one of its tools nominated as one of the five best in a category is an honor. Some categories had as many as fifteen companies in the hunt. Our tool testers are a tough bunch and put close to a four hundred tools through rigorous testing procedures in the year leading up to the nominations. Many of the companies called to express their delight at just being nominated. That's the objective part. Subjectively, I asked our readers to vote for their favorite tool from those five nominees in each of the twenty categories. From the notes that accompanied many of the ballots, some of the readers took this very seriously. Some indicated that they didn't vote in categories in which they had no knowledge, while others voted based on the brief descriptions that accompanied each nominee. I suspect some of the readers simply voted their "wish list" of tools they'd like to have in their shop. But why the votes fell the way they did is strictly a matter of individual free will. The manufacturers can determine those answers by directly polling hobbyists and other end users. (As a matter of curiosity, how many of you have been surveyed by a tool company after you've bought and used one of their tools? Drop me a note and I'll pass on the results in a later issue.)

One thing I found interesting was that none of the winners were pan-Asian companies—yet several of the winning tools are made there.

Rob

Happy Reader!

I was very surprised and happy to find I won a prize in the Readers' Choice Awards.

I've thought many times about making dovetail joints, but I have never tried. Now that I have a Joint Master Joinery System (my prize) I will try in the very near future.

Thank you for my prize.

Joe Martin
Northeastern Wisconsin
Woodworkers Guild

Thanks for taking the time to vote.
–Ed.

60 Weeks a Year?

In *Makes Me Proud* in the last issue, I would like Mr. Blossom to tell me his secret of getting 60 weeks in a year. I should like to be able to do the same. I also am retired, am 71 years of age, and do wood crafts and attend craft shows. I attend from 29 to 36 shows per year and I find I average more than 80 days at the shows per year. That leaves me no more than 285 to work; then there's shopping. It seems to be necessary to shop one day each week to restock my supplies, go to the bank, grocery shop, fill the gas tank and other shopping chores. This leaves me 233 days to work in my shop. Mr. Blossom says he works 6½ days per week which would be 338 days per year. He seems to have 105 more days than I do. What's your secret?

For the shows, I tow a 19 foot trailer loaded with 200 boxes of crafts. We make mostly the different and unusual–old type toys and games and household helpers. Some we think up ourselves, and I get plans for others.

I really enjoyed looking at the winning tools in this issue. I have several of the items and you are right about every one of them.

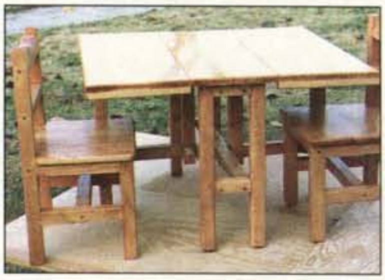
Les King
Snohomish, WA

I wish I had that kind of stamina.
–Ed.

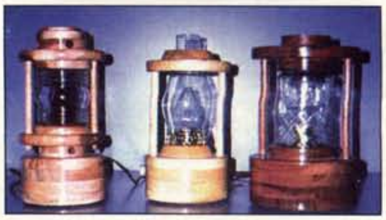
Makes Me Proud

Mildred Duffy of Elliston, VA got a router for her 78th birthday and wrote us for a book source. She told me how much she enjoys working in her shop and that she looked forward to mastering her router. I sent her a book on routers and told her that in exchange, I wanted a picture of her in action. I think she's a little shy.

Russell Finger of Fresno, CA built Paul Bourassa's Toddler's Chair (PW #69) then designed and built the matching gateleg table. Send us plans Russell, I know we'll get lots of requests when everyone sees this neat table.



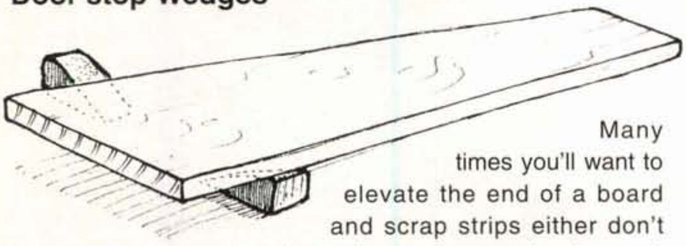
Wayne Van Scyoc of Grantville, PA has been having fun with Howard French's Old Oaken Lantern. To save the trouble of cutting the bottom off the jar, he takes them to a glass shop and has them drill a ¾" hole in the bottom. He uses a Ring-Master to cut all wood the rings.



Tricks of the Trade

Tricks of the Trade shares readers tips for making woodworking tasks easier and safer. Send your original, unpublished ideas to Tricks of the Trade, % Popular Woodworking, 1041 Shary Circle, Concord, CA 94518. *We* pay $25 for each TOT we publish.

Door stop Wedges



Many times you'll want to elevate the end of a board and scrap strips either don't match or slip out from under the work piece. I put two rubber doorstops under each side of the board for just the right pitch and no slipping.

John Reinhold
Desert Hot Springs, CA

$X = D \div (\sqrt{2} + 1)$

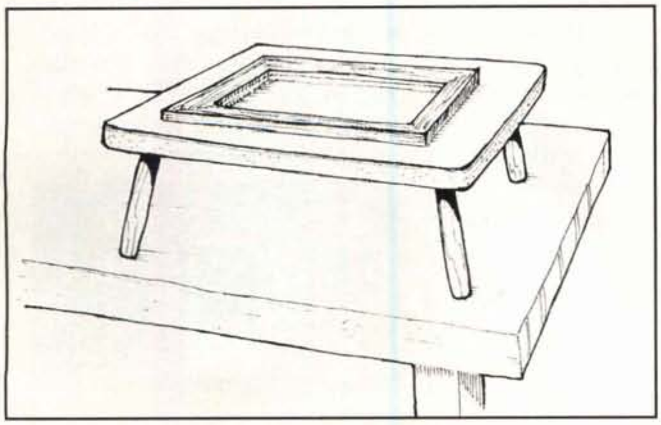
I recently built a pencil–post bed and wanted to also build matching nightstands. To build a taper jig similar to the one I used to cut the bed posts, I needed to determine the width of the face for each end of the taper. **X** is the length of the face and **D** is the diameter between the parallel faces of the octagon. $\sqrt{2}$ = 1.4142.

Ken Culver
Westerville, OH

A Higher Workbench

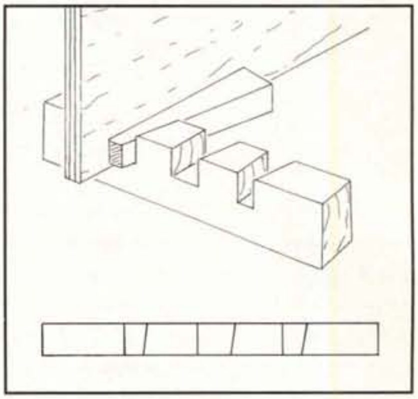
If you're tall or your workbench is a little too short, you may want to try what I've done. I take kitchen sink cutouts and mount short legs on them. These are excellent to use for gluing up picture frames or other small parts. They're perfectly flat and glue won't stick to them.

Eugene Daubenspeck
Beesville, IN



Sheet Support

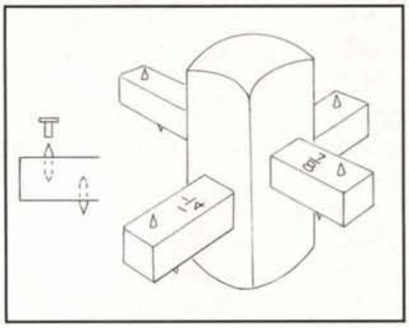
It's useful to be able to support sheet material or a door edgewise on the floor, or a partial sheet on the bench top. Cut the notches half way through the edge of a piece of 2 X 4. Place the notch for a door in the middle for the greater stability. Cut long, matching wedges to accommodate various sheet thicknesses. One support should do the job, but another one is helpful on long sheets.



Percy Blandford
Stratford–upon–Avon, England

Multiple Marking Gauge

In laying out many items, I found I was frequently resetting my marking gauge, and I was often repeating measurements. To save time and to ensure repeated accuracy, I made this multiple marking gauge. The stock is 1½" square hardwood and the stems are ¾" square. The pins are stout nails driven into predrilled holes on both sides of the stems. Cut off the heads so 3⁄16" of nail protrudes. File a point on the nails and check for accuracy. If it's a little off, adjust the point with a file. Then write the distance on the stems.



Percy Blandford
Stratford–upon–Avon, England

Nuclear Putty

Don't pitch that dried out wood putty. You can revive it by the same method you use to soften a hard dinner roll. Place a chunk of the putty on a paper plate, moisten with a few drops of water, and put it in the microwave oven for 15–20 seconds. The putty comes out soft and pliable.

Penny Hermsdorfer
Chambersburg, PA

We suspect this works best, and is safest using water or latex based putty—not solvent based putty.

—Editor

MLCS LTD.

MAKE BEAUTIFUL RAISED PANEL DOORS WITH YOUR . . . 1/4″ or 1/2″ ROUTER . . . 1/2″ or 3/4″ SHAPER

Professional production quality bit makes it quick and easy to produce matching rails and stiles — the panel raising bit with ball bearing guide makes the raised panel perfect every time.

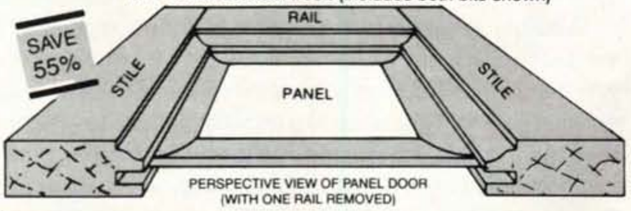
SALE PRICE FOR COMPLETE SET **$69.95** Regular value over $150.00!

1/4″ Shank set item **#554** (includes both bits shown)

SET ALSO AVAILABLE IN ½″ SHANK - $79.95 - Item #852

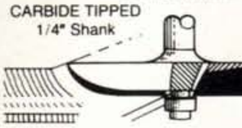
Shaper Cutters set: Item #1059
SAVE! only **$99.95**
Set: Rail & Stile & Raised Panel Cutters

SAVE 55%

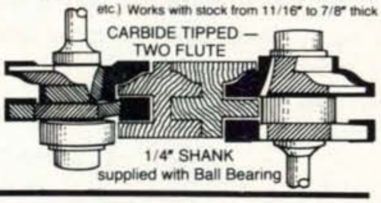


PERSPECTIVE VIEW OF PANEL DOOR (WITH ONE RAIL REMOVED)

RAISED PANEL BIT
SUPPLIED WITH BALL BEARING



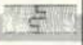
REVERSIBLE COMBINATION RAIL and STILE BIT
(For making matching rails and stiles in raised panel doors, etc.) Works with stock from 11/16″ to 7/8″ thick



CARBIDE TIPPED ROUTER BITS • PROFESSIONAL PRODUCTION QUALITY *GUARANTEED*

WHEN ORDERING ANY THREE OR MORE *DEDUCT $1.00 EACH*. • FREE SHIPPING IN CONTINENTAL U.S.

ITEM NO.	BEST CUT BEST PRICE	DESCRIPTION	ANGLE/DEPTH/RADIUS CIRCLE DIAMETER	LARGE DIA.	CUTTING LENGTH	SHANK SIZE	PRICE
#601		⅛″ **Spiral Cutter**		⅛″	½″	¼″ *	$ 9.00
#603	**Solid Carbide**	¼″ Spiral Cutter		¼″	¾″	¼″	$12.00
#903		¼″ Spiral Cutter		¼″	¾″	½″ *	$12.00
#904		⅜″ Spiral Cutter		⅜″	1″	½″ *	$24.00
#905		½″ Spiral Cutter	*Proper Adaptor Will Be Supplied	½″	1½″	½″	$29.00
#530		³⁄₁₆″ **Edge Beading**	³⁄₁₆″ Dia. of Circle		½″	¼″	$15.00
#531		⁵⁄₁₆″ Edge Beading	⁵⁄₁₆″ Dia. of Circle		½″	¼″	$15.50
#350		⅛″ **Round Over**	⅛″ R	¾″	⅜″	¼″	$11.00
#351		³⁄₁₆″ Round Over	³⁄₁₆″ R	⅞″	½″	¼″	$11.00
#230		¼″ Round Over	¼″ R	1″	½″	¼″	$12.00
#353		⁵⁄₁₆″ Round Over	⁵⁄₁₆″ R	1⅛″	½″	¼″	$14.00
#209		⅜″ Round Over	⅜″ R	1¼″	⅝″	¼″	$15.00
#355		½″ Round Over	½″ R	1½″	¾″	¼″	$17.00
#655		½″ Round Over	½″ R	1½″	¾″	½″	$17.00
#656		¾″ Round Over	¾″ R	2″	⅞″	½″	$21.00
#199		**Multiform Moulding**	Unlimited Patterns	2¼″	2″	½″	$40.00
#205		¼″ **Cove**	¼″ R	1″	½″	¼″	$12.00
#206		⅜″ Cove	⅜″ R	1¼″	⁹⁄₁₆″	¼″	$13.00
#207		½″ Cove	½″ R	1½″	⅝″	¼″	$14.00
#643		½″ Cove	½″ R	1½″	⅝″	½″	$15.00
#208		¾″ Cove	¾″ R	1⅞″	¾″	½″	$26.00
#231		⁵⁄₃₂″ **Roman Ogee**	⁵⁄₃₂″ R	1¼″	¹⁵⁄₃₂″	¼″	$16.00
#232		¼″ Roman Ogee	¼″ R	1½″	¾″	¼″	$17.00
#506		½″ **Pattern**	Flush Trim	½″	1″	¼″	$15.00
#508		¾″ Pattern	Flush Trim	¾″	1″	¼″	$17.00
#366		⅛″ **Slot Cutter**	⅜″ Deep	1¼″	⅛″	¼″	$14.00
#368		¼″ Slot Cutter	⅜″ Deep	1¼″	¼″	¼″	$14.00
#204		⅜″ Rabbeting	⅜″ Deep	1¼″	½″	¼″	$13.00
#670		⅜″ Rabbeting	⅜″ Deep	1¼″	½″	½″	$14.00

ITEM NO.	BEST CUT BEST PRICE	DESCRIPTION	ANGLE/DEPTH/RADIUS CIRCLE DIAMETER	LARGE DIA.	CUTTING LENGTH	SHANK SIZE	PRICE
#211		⅜″ **Core Box**	round nose	⅜″	⅜″	¼″	$10.00
#212		½″ Core Box	round nose	½″	¹¹⁄₃₂″	¼″	$13.00
#418		¾″ Core Box	round nose	¾″	⅝″	¼″	$15.00
#213		1″ Core Box	round nose	1″	¾″	½″	$17.00
#548		**Lockmitre**		2″	⅞″	¼″	$32.00
#214		¼″ **Straight**	plunge cutting	¼″	¾″	¼″	$ 6.50
#216		⅜″ Straight	plunge cutting	⅜″	1″	¼″	$ 6.50
#474		½″ Straight	plunge cutting	½″	1″	¼″	$ 7.00
#219		¾″ Straight	plunge cutting	¾″	1″	¼″	$ 9.50
#779		¾″ Straight	plunge cutting	¾″	1½″	½″	$10.00
#462		½″ **Bull Nose**	½″ Dia. of Circle		¾″	¼″	$16.00
#464		¾″ Bull Nose	¾″ Dia. of Circle		1″	¼″	$21.00
#764		¾″ Bull Nose	¾″ Dia. of Circle		1″	½″	$21.00
#545		**Tongue & Groove**	Straight 	1⅝″	1″	¼″	$29.00
#845		Tongue & Groove	Straight	1⅝″	1″	½″	$29.00
#546		Tongue & Groove	Wedge	1³⁄₁₆″	1″	¼″	$29.00
#846		Tongue & Groove	Wedge	1⅝″	1″	½″	$29.00
#450		⅛″ **Beading**	⅛″ R	¾″	⅜″	¼″	$11.00
#233		¼″ Beading	¼″ R	1″	½″	¼″	$13.00
#454		⅜″ Beading	⅜″ R	1¼″	⅝″	¼″	$15.50
#455		½″ Beading	½″ R	1½″	¾″	¼″	$17.00
#500		⅜″ **Flush**	**Trimming**	⅜″	½″	¼″	$ 7.00
#501		⅜″ Flush	**Trimming**	⅜″	1″	¼″	$ 7.50
#503		½″ Flush	Trimming	½″	1″	¼″	$ 8.50
#221		½″ Flush	Trimming	½″	1³⁄₁₆″	½″	$ 8.00
#558		**Thumbnail**		1³⁄₁₆″	⅜″	¼″	$18.50
#858		Thumbnail		2½″	¾″	½″	$35.00
#579		**Molding Plane**		1⅛″	1¾″	¼″	$31.95
#879		Molding Plane		1⅛″	1¾″	½″	$31.95

FREE — NEW 32-PAGE CATALOGUE • **While in the Philadelphia Area Visit Our Fully Stocked Showroom** (call for easy directions)

CONTROL THE SPEED OF YOUR ROUTER

ROUT AT THE SPEED THAT GIVES THE BEST RESULTS WITH THE WOOD AND BIT YOU ARE USING!

~~$39.95~~
SALE
$29.95
Order Item #197

FEATURES:

- **Works With All Routers 3¼ HP or less - 120V 15 Amp.**
- **Full Horsepower and Torque at All Speeds.**
- **Gives Your Router a Feature Only Available on Routers Costing Hundreds of Dollars!**

FORSTNER BITS

For *Perfect* Holes

Forstner bits are designed to drill flat bottom or through holes cleanly in end grain, thin stock, veneers and regular stock. Comes with its own attractive wood box and includes the following sizes: 1/4″, 3/8″, 1/2″, 5/8″, 3/4″, 7/8″, 1″, 1 1/8″, 1 1/4″, 1 3/8″, 1 1/2″, 1 5/8″, 1 3/4″, 1 7/8″, 2″, 2 1/8″.

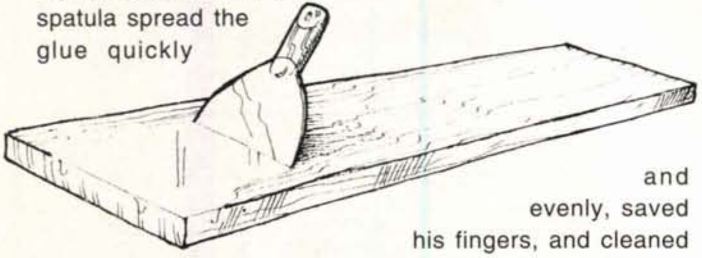
Regularly $99.95 ***Special Sale 16 Piece Set*** **$79.95** Order Set #314

©1993

To order by Master Charge, Visa, or Discover Call Toll Free, 7 Day - 24 Hour Order Service **1-800-533-9298** or send check to: **MLCS Ltd. P.O.Box 4053 PU, Rydal, PA 19046**

Glue Spreader I

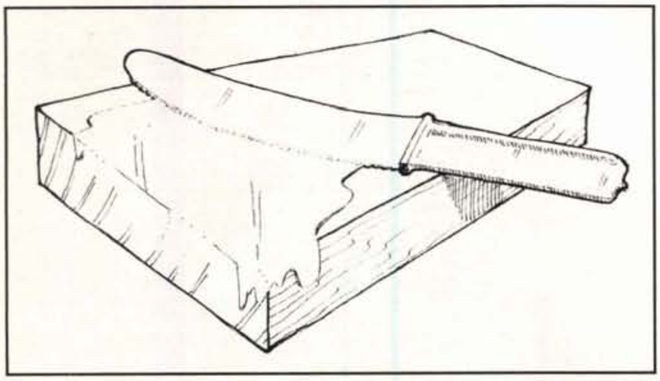
My husband recently had to laminate several long, wide boards. He simplified the job of spreading the glue by using a drywall spatula. The 6" spatula spread the glue quickly and evenly, saved his fingers, and cleaned up much easier than a paint brush.



Penny Hermsdorfer
Chambersburg, PA

Glue Spreader II

The best glue spreaders I know of are the plastic knives that I save after lunch at the local delicatessen. The serrated edge lets me spread just the right amount on the work piece.



When the glue dries, simply flex the blade and the glue pops right off. The blade is also easily shaped on the sander to make custom applicators.

Frederick McKinstry
El Paso, TX

Home Made Scroll Saw Blades

After several questions were directed to me about the price of scroll saw blades, I learned of a way to get such blades very inexpensively—make them. Band saw blades of the ⅛" and 1/16" variety are fragile and they will break. When you do, cut them into 5" lengths, and grind ½" of the teeth off each end so you can use them as fast cutting scroll saw blades. The grinding takes very little time at all. Seekers of economy scroll saw blades may take to buying band saw blade in bulk rolls because of the savings.

Hugh Foster
Manitowoc, WI

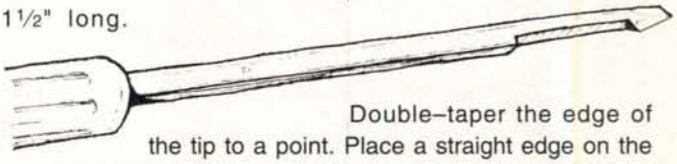
Save and Learn

Enrolling in a voc–tech program is both educational and will save you money on lumber costs. You do pay tuition, but you get to use machinery you probably can't afford to buy, and you get the assistance of a qualified instructor. There are usually 72 hours of instruction, you're expected to work on and complete projects, but the big savings is in lumber costs. Don't expect to walk out with 500 BF of cherry for your crafts business—the program exists to provide training and instruction. If you're reasonable and fair, they will be too. Voc–tech is a program where you can hone your woodworking skills and get a good deal on the price of lumber.

Russ Holzer
Altoona, PA

Plastic Sheet Cutter

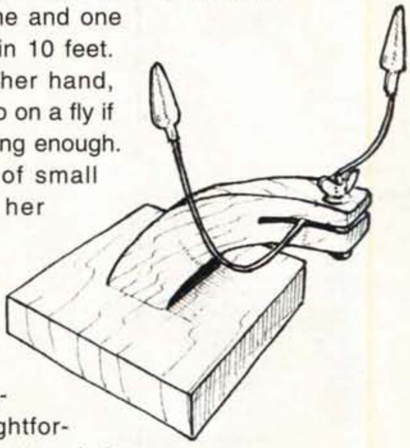
To cut a plastic sheet to the size I needed, I made my own cutter from an old ¼" flat–bladed screw driver. File a notch in the blade ¼" back from the tip and 1½" long. Double–taper the edge of the tip to a point. Place a straight edge on the work and make two or three scribes. Turn the piece over and make one or two more passes. Snap the plastic at the line for a clean break; then clean up the edge with a file and sandpaper.



Harold Mitchell
Spring Grove, IL

Handi–Hands

I'm a three coat painter—one on what I'm painting, one on me and one on everything within 10 feet. My wife on the other hand, could paint a tuxedo on a fly if it would hold still long enough. She makes a lot of small craft items and her problem is holding on to them while they dry. This is what I made for her. The woodworking is pretty straightforward—use a ¼" carriage bolt and wing nut to clamp the #12 solid wire in place. Solder an alligator clip to each end of the wire and you're set.



David Black, Jr.
Barnwell, SC

Advanced technology allows **Furniture Medic®** to perform various types of on-site furniture repair, including scratches, dents, water marks, finish imperfections, broken joints, etc.

TURN YOUR HOBBY INTO A BUSINESS

As a Furniture Medic® you write "the prescription for damaged furniture"®, and by filling it yourself, reap the rewards.

The market for our services is unlimited. Furniture manufacturers, retailers, shippers, moving companies, insurance companies, need furniture touch-up and repair services. In addition, hotels, motels, restaurants, doctor's offices, country clubs, and other commercial settings where furniture must be maintained in top condition while taking heavy wear and tear, are also large potential customers for **Furniture Medic®**. Literally thousands of customers in each territory can use **Furniture Medic®** extensively and repeatedly to improve their image and at the same time reduce the high cost of furniture replacement.

WE OFFER:

- Comprehensive training - no experience required.
- No cost materials and supplies*.
- Continuous support.
- Research and development support.
- Complete advertising materials and national advertising support.
- Flexible work schedules.
- Low overhead/low capital concept.

YOUR INVESTMENT STARTS AT $10,500* AND IS SECURED BY EQUIPMENT AND TRAINING.

See how scratches and dents can put you into business for yourself. For more information call **Furniture Medic®**. We accept calls 24 hours a day, 7 days a week. Call at your convenience.

(404) 361-9933 or (800) 877-9933

FURNITURE MEDIC®
the prescription for damaged furniture®

* See Prospectus for details.

The Finishing Forum

by Tom Wisshack

Perfecting a Hand–Rubbed Oil Finish

The number of oil finishes on the market today is bewildering. I have found one of the most attractive finishes to be a simple, homemade formula: boiled linseed oil, turpentine and a few drops of Japan drier. The results I achieve from this simple solution can rival any store–bought equivalent at half the cost.

A linseed oil finish is used on very special pieces of furniture that won't be exposed to rough use or spillage. Don't use it on a dining room or kitchen table. Antique furniture is also not recommended since the effect may be irreversible.

No finish, regardless of the manufacturer's claims, is going to magically give you a gorgeous hand-rubbed surface. That requires work. I took great care to finish the pieces shown here and the effort has more than paid off in the enjoyment I get from watching the color and grain of the wood become richer and more mellow with time.

There are no hard and fast rules to oil finishing. The directions given here are meant as guidelines. Feel free to experiment with various products, procedures and drying times.

Surface Preparation

The performance of a homemade oil finish relies on the care taken to prepare the surface. Unlike a varnish or lacquer which can hide imperfections by sitting on top of the wood, an oil finish penetrates and is likely to magnify surface flaws. Some people consider my attitude about surface preparation fanatical, but I've never been sorry about the extra time I've spent.

If you've hand–planed the surface and want to preserve its tactile quality, I suggest you lightly hand sand your project with 600–grit wet–dry paper. Most of you will probably rely on machinery and abrasives to produce a good surface. In that case, I suggest you first remove all mill marks with a sharp hand scraper. Don't rely on sandpaper for the whole process.

The next step is to raise the grain by sponging the piece with hot water. This will force any additional flaws to the surface so you can remove them, and make the finished wood easier to repair if it comes into contact with water. Although water won't damage solid wood, I don't recommend this procedure on veneered surfaces. Let your piece dry overnight before sanding.

If your piece has large flat areas, begin the sanding process with 220–grit wet–dry paper on an orbital sander. After the surface has been dressed down sufficiently, switch to 280 and sand through 400–grit. Vacuum thoroughly after each grit. This removes the coarser grit left behind and gives you an opportunity to spot surface flaws.

Finally, hand–sand with the grain with 400–grit paper on a cork–faced pine sanding block. For areas that can't be reached with a sander, I suggest the same procedure but use a hand–held sanding block.

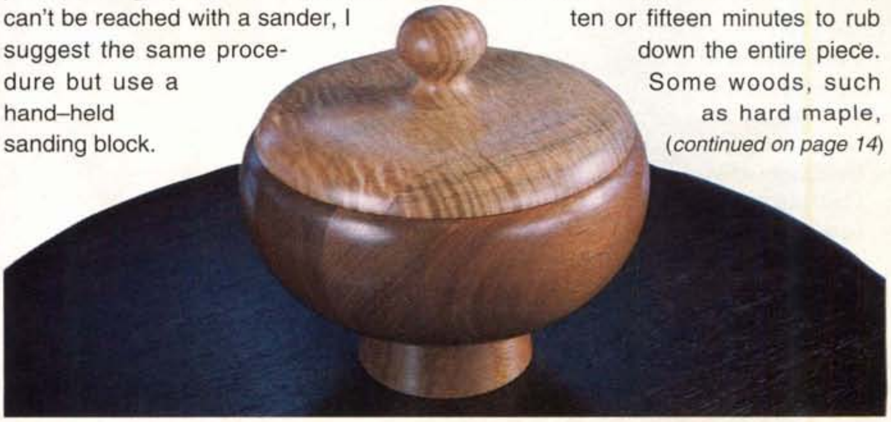
In some cases you may be able to skip the 220 and start with 280. I sometimes continue the sanding process on my contemporary furniture with 600–grit automotive paper, and finish up with 1000–grit. Remember, finer grits of paper actually polish the wood and bring the grain and color into focus.

Applying the Oil Finish

Linseed oil is a relatively slow drying finish, so don't apply it to wood surfaces straight from the can. To enhance the drying process and give the wood more clarity, thin the finish with turpentine. Two parts boiled linseed oil to one part pure spirits of turpentine make a good basic formula. You can experiment with slightly different proportions, but always add a few drops of Japan drier. This greatly improves the drying and hardening of the finish. Japan drier can be found at most paint stores.

For even application and absorption, apply the first coat of oil with a soft, pure–bristle brush. Work a liberal coat of the solution onto one surface at a time until it is completely covered. Let the piece stand in a warm, well–ventilated area for up to thirty minutes, then sprinkle the piece with a small amount of rottenstone abrasive powder—much finer then pumice, it's available at most paint and hardware stores. Give your project a brisk rub with the grain with a piece of terry cloth. The oil and rottenstone mixture forms a gray or slurry that won't discolor the wood. Take ten or fifteen minutes to rub down the entire piece. Some woods, such as hard maple,

(continued on page 14)



***Tom Wisshack** is co-editor of The Finishing Forum. An artist and historian, he builds and restores fine furniture in Galesburg, IL.*

A NEW WAY TO CARRY ON A FINISHING TRADITION.

The Wagner FineCoat is unlike any finishing method you've ever seen before. But it can put a classic, professional finish on the woodworking projects you're doing now, right in your own workshop.

FineCoat's secret is Wagner's High-Volume, Low-Pressure (HVLP) technology. It allows you to spray, with very little bounceback or over-spray. You don't need a spray booth, just an open mind and a few minutes to read about FineCoat's advantages.

FineCoat gives you a professional spray finish. Coverage is smooth and even over the most intricate pieces.

Spray any finish on the shelf.

The FineCoat can give you the type of finish you had in mind, from the start of the project. It handles urethanes, oils, varnishes, shellacs, lacquers, stains, even enamel paints. Every FineCoat unit also comes with helpful hints for thinning and spraying different materials.

Your hand has never had this much control.

With FineCoat you can get close, without dripping, or cover large areas. The spray width adjusts from ¼", to a foot wide. You can also adjust to a vertical, horizontal, or circular pattern, without changing nozzles.

While your coats are drying, the spray gun stands securely in its own unit. And when the last coat is on, check your watch. You'll most likely be done finishing and cleaning-up, in less time than you used to spend on the finishing process alone.

¼" To 12" Wide

To find out more about FineCoat, call 1-800-328-8251. We'll send you more information or refer you to a FineCoat dealer.

The FineCoat unit is portable, storable, and plugs into any 120V outlet.

Send for free literature or a helpful demonstration video.

Check the first box below and we'll send you more literature on HVLP spraying and the FineCoat sprayer. Or, check the second box and send $3 to cover postage and handling. We'll send you the literature along with a videotape demonstrating the usage and applications of FineCoat.

☐ Send me more information, free.

☐ Send me information and the FineCoat video for $3. (Enclose a check payable to Wagner Spray Tech, or we'll charge it to your MasterCard #________________, or your Visa #________________.)

NAME____________________

ADDRESS____________________

CITY____________________

STATE__________ ZIP__________

Mail to: Wagner FineCoat, 1770 Fernbrook Ln., Plymouth, MN 55447

PW 6/93

WAGNER®

FineCoat™

Low Overspray Finishing System

© 1991 Wagner Spray Tech Corp. FineCoat is a trademark of Wagner Spray Tech Corp.

develop a shine this way. If so, you may either omit the rottenstone and simply rub the oil with a cloth, or substitute steel wool for the abrasive powder. If you have sanded your project with 600 or 1000–grit paper, you may not need to rub at all.

After you've applied the first coat, apply the following coats by simply wiping the oil on with a soft cloth, such as an old cotton t–shirt; then remove all surplus oil from the surface. No additional rubbing is needed. I've used anywhere from 1 to 8 coats on some of my pieces depending on the hardness and density of the wood and the condition of the surface. It's a good idea to wait as long as possible between coats. Applying too many coats in a short span of time forces too much oil into the wood and results in a greasy look. I wait from 2 to 3 weeks between coats for a drier, more mature finish. Remember that oil–soaked rags are extremely flammable. Soak them in water and dispose of them outdoors in a closed container.

Variations on the Oil Finish

My homemade oil finish is versatile and can be used with a number of other finishes to help protect the surface. A coat of clear paste wax adds durability and gives excellent results without destroying the integrity of the finish. A product like clear Trewax or Butchers Wax has a high carnauba content and gives the best results. Give the oil finish several weeks to set before applying any wax, otherwise the wax soaks in and has no effect. Use a tinted wax for better results on dark woods. Tints are available for many wood tones, but they don't leave as hard a film as other waxes. (Tinted waxes are available *from* Liberon Supplies, Box 86, Mendocino, CA 95460.)

For even more durability, I've found a number of commercial oil finishes and tung oil/varnish mixtures that can be used over the homemade oil finish. But keep in mind, these products change the tactile quality of an oil finish, especially oil/polyurethane mixtures. A product I often *use over my oil* finish is Formby's Low Gloss Tung Oil Finish. Technically, it's a wiping varnish and is applied with a cloth to give excellent protection. It more or less retains the look of the homemade oil solution, but may need rubbing down with steel wool as a final step.

Oil Finish Maintenance

It's true an oil finish requires maintenance to keep its luster. If the piece sits safely in a corner, you may not need to worry, but for a coffee table or chair it's good to know the basics.

Rub a fresh coat of oil into the surface of your piece every year or so. You'll find that each rub down enhances the beauty of the wood.

Scratches, scuffs and spills may need more aggressive action. A pad of fine (4–0000) steel wool, dipped in oil solution and rubbed briskly with the grain may remedy the problem.

To remove a deep abrasion, wet sand with oil and fine (400 to 600–grit) paper. Rub down the entire surface for a uniform sheen, and be careful not to scratch your perfectly sanded wood. Use a cork–faced sanding block to keep your fingers from causing indentations. Finish up with a pad of fine steel wool dipped in oil solution and rottenstone. Sanding too deeply on a piece that was oil finished some time ago may reveal darker or lighter wood underneath.

If you need to repair a piece of furniture but do not wish to risk darkening it with oil, a good technique is to do the repair with mineral oil (available at most drug stores). After it's wiped off, it has no effect on the wood and leaves a beautiful surface. The woodfinisher's equivalent to mineral oil is paraffin oil—practically the same thing but thicker and usually used as a lubricant in rubbing out other finishes.

Opinions on the pros and cons of oil finishes differ widely, but I believe if we view oil as just one of many finishing systems available to us as woodworkers, we must agree that on certain pieces of furniture an oil finish cannot be surpassed in its beauty and ability to develop a patina over time. PW

FREE! w/Order!

48 Page Wood Parts Catalog

1993 Wood Parts Catalog

& **Glit Sanding Stik**
Mini-belt sander, ideal for detailed or unreachable spots.
Regular $3.00/ea.

EXPIRES: 7-1-93

Description	Your Cost
3-1/2" Shaker Peg	$13.00 / 100
2-7/16" Medium Peg	$11.00 / 100
1-3/4" Mini Peg	$ 5.50 / 100
1-3/8" Candle Cup	$13.00 / 100
5/8" Mini Candle Cup	$ 4.50 / 100
1" Toy Wheel	$ 4.50 / 100
1-1/4" Toy Wheel	$ 6.00 / 100
1-1/2" Toy Wheel	$ 7.00 / 100
2" Toy Wheel	$15.00 / 100
Axle Peg for Above	$ 3.50 / 100
1-1/2" Birch Spindle	$ 7.00 / 100
2" Birch Spindle	$11.00 / 100
3/8" or 1/2" Birch Button	$ 1.50 / 100
3/4" Block	$ 7.00 / 100
1" Block	$ 6.00 / 50
1-1/4" Block	$ 7.25 / 50
3/4" Ball	$ 6.00 / 100
1" Ball	$ 8.00 / 100
1-1/2" Ball	$ 2.20 / 10
2" Ball	$ 5.50 / 10
2-1/2" Ball	$10.00 / 10
3" Ball	$ 2.40 / EA
3/4" x 7/8" Mini Apple	$ 7.00 / 100
2-1/2" x 2-5/8" Lg. Apple	$ 1.50 / EA
2-1/2" Hen Egg	$10.50 / 25
4-1/4" Goose Egg	$ 2.50 / EA
5/8" Picture Hanger	$ 1.50 / 100
1-5/8" Sawtooth Hanger	$ 2.00 / 100
#17 Screw Eye 1/2" Long	$ 1.50 / 100

1-800-722-0311

Please refer to Source #P33

TO ORDER: We accept M/C, VISA Check, or M.O. All orders add $5.00 Handling
TX add 7% tax. Canada add 20%
Alaska, Hawaii add 15% for freight.

Woodworks

P.O. Box 14567 Ft. Worth, TX 76117

Book Reviews

by Hugh Foster

Puzzles Old & New: How to Make and Solve Them by Jerry Slocum and Jack Botermans. (University of Washington Press, Seattle, WA 98145) 160 pages, paperback, $24.95.

Originally published in 1986, this volume has gained in popularity. While only about 25 pages has anything at all to do with woodworking, it is nevertheless fascinating from beginning to end. The authors begin with a definition of a mechanical puzzle and go on to define ten specific kinds of puzzles, each as fascinating as the other.

Of greatest interest, specifically from a woodworking sense, is the Burr Puzzle—puzzles made of interlocking pieces. The burr puzzle's description is derived from descriptions originally given in *The Journal of Recreational Mathematics*. *Puzzles Old & New* not only shows us how to reproduce some famous examples of these puzzles, but also shows you how to design your own or at least attempt to.

If you're after a project that will challenge both your brain and your manual dexterity without breaking the bank, and one that doesn't requiring a whole shopful of fancy tools, these puzzles may be exactly what you need.

Taken as a whole, the book is well written and handsomely illustrated with color and black–and–white photos, as well as line drawings where they're appropriate.

If you want puzzles in depth, there isn't a better place to start—you can't do much better than this. I highly recommend this work.

Econ-Abrasives
WE MANUFACTURE ABRASIVE BELTS ANY SIZE, ANY GRIT!

ABRASIVE SHEETS:
(9 X 11)

CABINET PAPER

	50/pk	100/pk
40D	$17.00	$32.00C
50D	16.00	29.00
60D	15.00	27.00
80D	14.00	25.00
100 thru 150C	13.00	23.00

FINISHING PAPER

80A	$10.00	$17.00C
100 thru 280A	9.00	15.00

NO LOAD PAPER

180 thru 400A	$11.00	$19.00C

"C" = 100 SHEETS

ABRASIVE BELTS
PLEASE SPECIFY GRITS

1X30	$ .73 ea.	3X24	$ .84 ea.
1X42	.73	3X27	.87
1X44	.73	4X21 3/4	.96
2 1/2X16	.77	4X24	.99
3X18	.78	4X36	1.20
3X21	.81	6X48	3.14
3X23 3/4	.84	2 1/4X80	2.94

Other sizes priced upon request

JUMBO BELT CLEANING STICK ONLY $8.80
2X2X12

STEEL BAR CLAMPS
Quick release feature, available in four different lengths, these clamps are fast adjusting with cast iron jaws.

Size	Price
2-1/2 x 6	$6.50 ea.
2-1/2 x 12	7.00
2-1/2 x 24	7.75
2-1/2 x 36	9.50

HEAVY DUTY VELCRO® VACUUM DISCS
8 Hole pattern
For Bosch Sanders

Dia.	Grit	Price	Dia.	Grit	Price
5"	60	$ .48 ea.	6"	60	$ .65 ea.
5"	80	.46	6"	80	.63
	100 thru			100 thru	
5"	320	.45	6"	320	.62

HEAVY DUTY SPRING CLAMPS
Clamps come with PVC tips and grips.

Size	Price
4"	$1.75 ea.
6"	2.25
8"	3.50

PSA DISC ROLLS(White)
silicon carbide for D A sanders

Size	Grit	Price/Roll	Discs Per Roll
5"	80	$16.04	125
5"	120	15.51	125
5"	180	31.04	250
5"	220	31.04	250
5"	320	31.04	250
Size	Grit	Price/Roll	Discs Per Roll
6"	80	$22.93	125
6"	120	21.15	125
6"	180	44.53	250
6"	220	44.53	250
6"	320	44.53	250

OTHER PRODUCTS
*ROLLS*FLAP WHEELS*PUMP SLEEVES*ROUTER BITS*WOOD GLUE*WOOD BITS*SANDING BLOCKS*DRAWER SLIDES *HINGES*TV SWIVELS

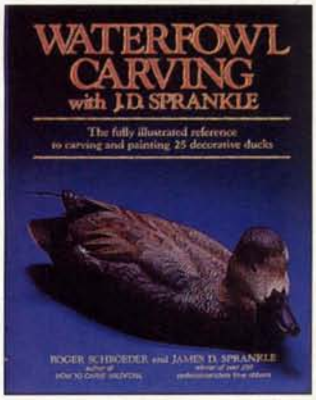
*MasterCard, VISA, Check or C.O.D
*SATISFACTION GUARANTEED!!!
- TX & NV Add Sales Tax
- Continental U. S. Shipping Charges add $5.50

Econ-Abrasives
P. O. Box P865021
Plano, TX 75086
(214)377-9779

CALL FOR FREE 1992 CATALOG!

Toll-Free (800)367-4101

Waterfowl Carving with J.D. Sprankle by Roger Schroeder and James D. Sprankle (Stackpole Books, Harrisburg, PA 17105) 224 pages, hardcover, $42.95.



Roger Schroeder first introduced us to J.D. Sprankle in 1984 with his landmark book, *How to Carve Wildfowl*. Since then, the carving market has been flooded with bird carving books but this book, the author's second, remains by far the best instructional book on carving decoys and championship waterfowl.

Nearly 250 excellent black and white photos take you through the complete process of carving and painting a gadwall drake. Patterns and photos of two dozen additional birds will keep you busy for a long time, even if you don't get as detailed as J.D. Sprankle does. Color photos show you exactly how all the birds should look when finished.

This is a book of incredible detail. How else can you get a piece of basswood to end up looking like a real bird? Sprankle demonstrates how to hollow, balance, and glue the body so it will float correctly, how to carve the bill and feathers so they look exactly right from every angle, how to use plastic wood in attaching the head to the body and inserting the eye in the head, and how to paint the bird realistically.

If you end up with a bird only half as detailed as his, your bird will be very good indeed.

Popular Woodworking Binders

These hardcover binders store and protect your issues of Popular Woodworking, keeping them organized for easy reference.

Each handsome brown binder holds two years' worth of issues—12 magazines in all.

They're kept in place by thin metal rods secured at the top and bottom. These sturdy binders will keep your magazines handy and in top condition.

One binder $9.95, plus $2.00 S&H (Canada $4.00 S&H). For 3 or more $8.95 each, plus $1.00 S&H per binder (Canada $2.00 S&H)

Popular Woodworking
1041 Shary Circle, Concord, CA 94518

Back by Popular Demand!

Back issues of Popular Woodworking are still available!

Fun–to–build projects and practical techniques from past issues!

The following are still available—but supplies are limited!

#72 May 1993 $4.50

Horse Push Toy, Carve An Egg, Crown Moulding Jewelry Box, Secretary Desk, Salmon Wall Plaque, 4–Jaw Chuck, Sewing Cabinet, Wooden Bar Clamps, Folding Step/Chair, *Readers' Choice Winners*

#71 March 1993 $4.50

Forever Turning Whirligig, Antique Mirror Frame, Gun Cabinet, Cube Puzzle, Child's High Chair, Wooden Mallet, Turned Toothpick Holders, A Simple, Graceful Dining Table, Carve A Bunny, Lemon Reamer

#70 January 1993 $4.50

Carve A Bear, A Dancer's Table, Bead Roller Coaster, Tall Swedish Clock, Western Boot Jack, Colonial Salt Box, Twin Spindle Sander Attachment, Whaler's Sea Chest, Tie Rack, Shaker Candlestand, MotoTool Mount For The Lathe, Crayon Truck, Readers' Choice Nominees

#68 September 1992 $4.50

Carved Nut Bowl & Cracker, Knock Down Couch, Oak Burl Jewelry Chest, Rolling Shop Caddy, Peter Putter, Old Mill Wheel, Roll Top Desk II, Desktop Dolphin, Mystery Lamp, *Band Saws*

#67 July 1992 $4.50

CD Carousel, Knickknack Shelf,Typing Stand, Veneering, High–Back Chair Southwestern Skull, Uncle Sam Whirligig, Roll Top Desk I, Shop Table, Dust Collectors

#66 May 1992 $4.50

Lumber Storage Rack, Spiral Turning, Belt Buckles, Carved Corner Cabinet, Outdoor Furniture, Jointer Push Blocks, Wooden Jack Plane, Curved Glass Wall Sconce, Lathe Tool Rack, Tambour Planters, Band Saw Fixture

#63 November 1991 $3.95

Nativity Wreath, Book Caddy, Tabletop Hockey, Disc Sander/Grinder, Victorian Wall Box, Rocky Mountain Coon Dog, Home Computer Desk, Old– Time Toboggan, Wooden Whistles, Sandpaper Press, Sunburst Plates, Off–Road Toys, Router Work Center

#61 July 1991 $3.95

Chippendale Mirror, Biscuit–Joined Table, Gardening Stool, Laminated Picture Frames, Miter Jig, Swiss–Style Chip Carving, Trastero, Light Fixture,

#59 March 1991 $3.95

Dust Bench, Benchtop Clamp, Sailor's Work Picture Frame, Occasional Table, Spiral Lamp Bases, Dinosaur Bank & Bookends, Country Cupboard, Kitchen Storage Rack, Turned & Carved Bowl, Small Chest of Drawers

#57 November 1990 $3.95

Spindle–Back Chair, Rocking Horse Chair, Carved Wall Cabinet, Coopered Bowl, Scroll–Sawn Animals, Wood Mosaics, Indian Carvings

#56 September1990 $3.95

Roadrunner Whirligig, Log Turning, Serving Cart, Country Mailbox, Piano Music Box, Toy Carousel, Cube and Canister Drum Sanding System, Laminating Woodcarving Blocks

#55 July 1990 $3.95

Victorian Mailbox Post, Plate Shelf, Bee Hive Jewelry Box, Sliding Miter Table, Writing Desk, Bent Wood Indian Boxes, Carver's Mallet, Child's Desk & Magazine Rack, Mini Mailbox

#54 May 1990 $3.95

Captain's Bed, Centering Tools, Child's Toybox/Chair, Computer Security Cabinet, Cutlery Box, Candlestick, Indian Adze, Windsor Stools, Step Ladder, Fretwork Shelf/Mirror

#52 January 1990 $3.95

Sculpted Coffee Table, Folding Candelabra, Ladle, Firewood Box, Butterfly Figures, Cedar–Lined Chest, Extension Cord Reel, Pole Lamp

#45 November 1988 $2.95

Panel Doors, Silver Chest, Corner Pewter Hutch, Country Sconce, Massachusetts Lowboy, Oak Splint Basket–making

#44 September 1988 $2.95

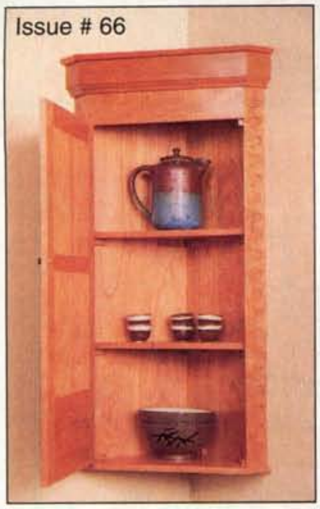
Child's Dresser, Peeled Branch Settee, Marionette, Bandsawn Basket, Making Chisels and Gouges, Chisel Box

#41 March 1988 $2.95

Turned Boxes, Jewelry Chest, Table, Wooden Buckets, Dry Sink TV Cabinet, Relief Carving

#39 November 1987 $2.95

Antique Wall Cupboard, Relief Carving, Wooden Buttons, Couch and Chairs, Handscrew Clamps, Tall Chest of Drawers



#37 July 1987 $2.95

An Interview with James Krenov, Bed, Crotch Wood Candy Dish, Dinner Table, Carving An Arabian Stallion II, Metal Inlay, Osage Orange Woodcarver's Mallet

#36 May 1987 $2.95

Folding Picnic Table, Carving an Arabian Stallion Part I, High Chair, Wooden Salad Tongs, Home Shop Wiring, Shop_Built Accessories for the Drill Press

#35 March 1987 $2.95

Building a Butcher Block Work Center, Ladder-Back Rocker, Amazing Folding Stool, Making Knives, The Sawyers Whirligig, Woodworker's Beam

#33 November 1986 $2.95

How to Make a Serving Bowl, Home Entertainment Center, Art of Sandblasting Wooden Signs

#32 September 1986 $2.95

Martha Thompson's Magical Mirrors, Power Carver's Tool Cabinet, Building a Wine Rack, Marquetry Techniques, Early American Wall Shelf, Carving the Human Head Part V

#31 July 1986 $2.95

Make Your Own Solar Kiln, Making a Watch Clock, Penultimate Patio Chair, 2-Drawer Cassette Chest Carving the Human Head Part IV

#30 May 1986 $2.95

Hidden–Haunched Mortise and Tenon, Teak Serving Cart, Trestle Table & Stool, Carving the Human Head Part III

#29 March 1986 $2.95

Marquetry, Piano Bench, Signaling Sailor Whirligig, Carving the Human Head Part II, Model Airplanes, Boatbuilding Basics

#9 November 1982 $1.50

Staining Wood, Three Show and Carver Profiles, Thin Blades, Amazonian Hardwoods II, Power Hand Tool Carving Part 7

#7 July 1982 $1.50

Interview with Sam Maloof, Make a Maloof Table Pedestal, Create a Maloof Finish

#2 July 1982 $1.00

Solar Heated Lumber Drier, Dupli–Carver, SCORE (SBA), Carter Products Guidall 500-3

#1 July 1982 $1.00

Vibration Dampening, Goodwill's Contract Shop, 3rd Annual Berkeley Wood Conference, Milwaukee Electric Chain Saw

COMPLETE SET OF ALL AVAILABLE BACK ISSUES FOR ONLY $90.00!

Check the issues you want, cut off this order form, and mail it with your check or money order to:

Popular Woodworking

Back Issues #WI
1041Shary Circle
Concord, CA 94518

Name ____________________

Address ____________________

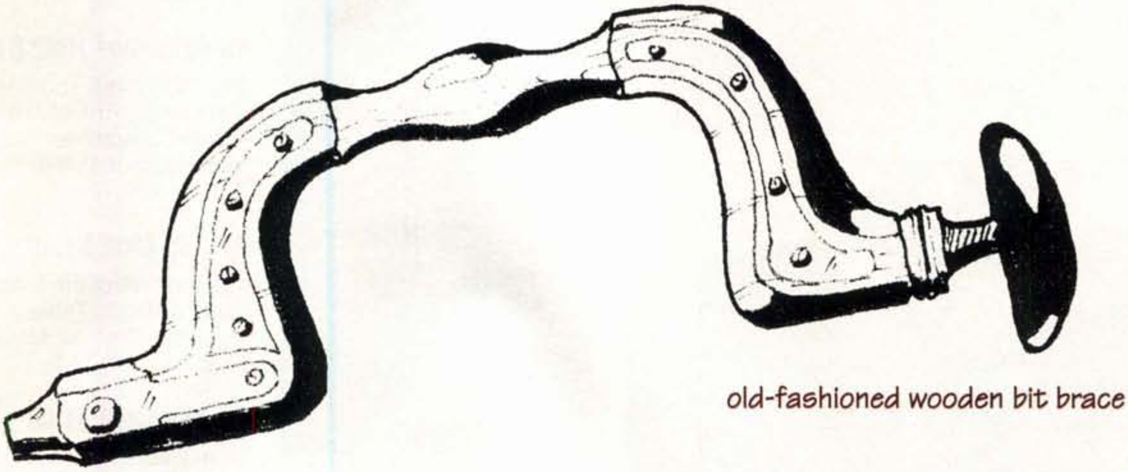
City __________ **State** ______ **Zip** ______

Please add 50¢ per copy for postage & handling. Allow 4–6 weeks for delivery.

Total Amount Enclosed ____________________

☐ complete set $90.00
☐ #72 May 1993 $4.50
☐ #71 Mar 1993 $4.50
☐ #70 Jan 1993 $4.50
☐ #68 Sep 1992 $4.50
☐ #67 July 1992 $4.50
☐ #66 May 1992 $4.50
☐ #63 Nov 1991 $3.95
☐ #61 Jul 1991 $3.95
☐ #59 Mar 1991 $3.95
☐ #57 Nov 1990 $3.95
☐ #56 Sep 1990 $3.95
☐ #55 Jul 1990 $3.95
☐ #54 May 1990 $3.95
☐ #52 Jan 1990 $3.95
☐ #45 Nov 1988 $2.95
☐ #44 Sep 1988 $2.95
☐ #41 Mar 1988 $2.95
☐ #39 Nov 1987 $2.95
☐ #37 Jul 1987 $2.95
☐ #36 May 1987 $2.95
☐ #35 Mar 1987 $2.95
☐ #33 Nov 1986 $2.95
☐ #32 Sep 1986 $2.95
☐ #31 Jul 1986 $2.95
☐ #30 May 1986 $2.95
☐ #29 Mar 1986 $2.95
☐ #9 Nov 1982 $1.50
☐ #7 Jul 1982 $1.50
☐ #2 Jul 1981 $1.00
☐ #1 May 1981 $1.00

The Boring Truth About Bits



old-fashioned wooden bit brace

A bit is a tool used in a drill or a bit–brace to bore a hole. There are many bits that do other things as well, such as reaming, countersinking, and turning screws, but in general the term *bit* is usually associated with a tool that makes a hole. The action of making a hole—usually a circular hole—is generally called boring, but some people also use the term *drilling.* The former term implies a rotary action, whereas the latter term originally referred to any form of groove or furrow.

Since the most common tool used for making holes in woodworking is known as a drill, refering to *drilling* is quite understandable, since drill–bits are often confused with drills. To complicate matters further, a machinist refers to his bits as *drills* whereas the woodworker understands 'drill' to mean the tool that holds the bits.

To minimize the confusion, we will stick to *boring* to describe the process of making the hole—with whatever tool and in whatever fashion. We'll use *drill* when we refer to tools—electric drill, the cordless drill, or even the Archimedean drill—that hold and operate the bits, and reserve *bit* or *drill–bit* for the tools that actually bore the holes. The only exception to this system is that class of boring bits known as twist–drills.

The Bit–Brace

One of the quintessential emblems of woodworking, along with the plane, is the old–fashioned bit brace. Since the advent of the electric drill, and especially since the arrival of the cordless electric drill, the bit–brace, or brace as it is more commonly referred to, has all but disappeared from the average toolbox. With it has gone the amazing selection of bits that were designed for a wide variety of jobs, to be largely replaced by the high–speed spade bit and twist–drill.

There is no denying the efficiency of a completely portable powertool, unfettered by extension cords, that can be carried anywhere and operated with one hand and is equally useful for boring holes or driving screws. But as with many modern powertools, a certain amount of sophistication has been lost along the way in the pursuit of speed and ease of use.

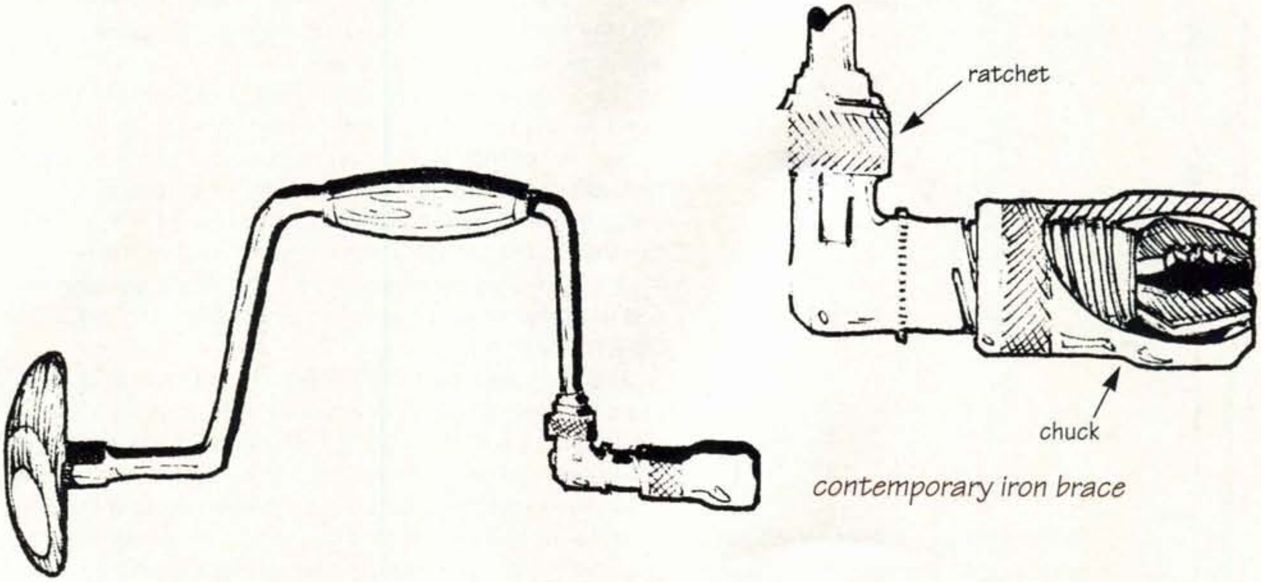
Despite the almost complete abandonment of the brace for the electric drill, most woodworkers are still familiar with the standard iron brace. Many also are familiar with its predecessor, the wooden bit–brace, especially when images of traditional handcrafted woodwork are conjured up. Few, however, would recognize many of the bits these tools used and could still be used to advantage.

Speed and power are not everything, and more than one woodworker has been frustrated by a low charge or a worn variable–speed trigger on the electric drill. Furthermore, not all holes are created—or meant to be created—equal. The wide selection of special–purpose bits that can be used in a brace can accomplish boring operations that are difficult to achieve with an electric drill, or even the more powerful drill press.

Braces are still plentiful and cheap. They are designed with a wide variety of chucks to hold the bit and many also are equipped with ratchets to permit controlling the direction of turning. Nevertheless, they are all easily understood if disassembled and it's not hard to judge the quality or usefulness of a brace, even if bought second–hand at a flea market.

John Watson *makes furniture and writes about woodworking in Inverness, California.*

by John Watson



contemporary iron brace

The Mystery Bits

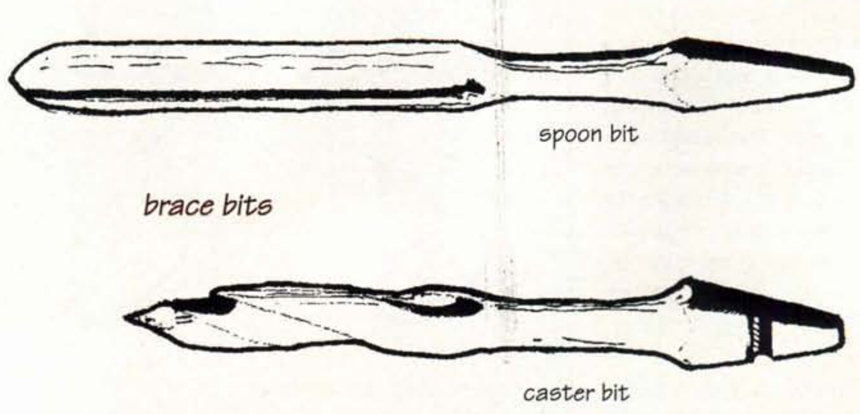
The first clue to identifying a bit designed for a bit–brace is its square shank. In a pinch, many braces will hold bits with round shanks, but the jaws of most chucks are designed to grip bits with square, tapered shanks. Iron braces hold the bit by tightening the chuck on the bit. Wooden braces were made with a variety of chucks that became increasingly sophisticated with time. Early braces simply received the square shank of the bit and used a screw to fasten it while later models were fitted with various spring–loaded pins that engaged a slot or groove formed in the side of the square shank.

Bits were specially filed to fit particular braces or left plain for the owner to file a notch to suit any given brace. Some bits may be found to have more than one groove filed on different sides of the square shank indicating its use in various braces. But with or without these grooves, almost any square–shanked bit can be accepted by almost any iron brace. It should also be noted that, as with most other successful kinds of woodworking tools, the brace has been produced in a variety of sizes and it is possible to find an extra small brace that will not accept a particular bit.

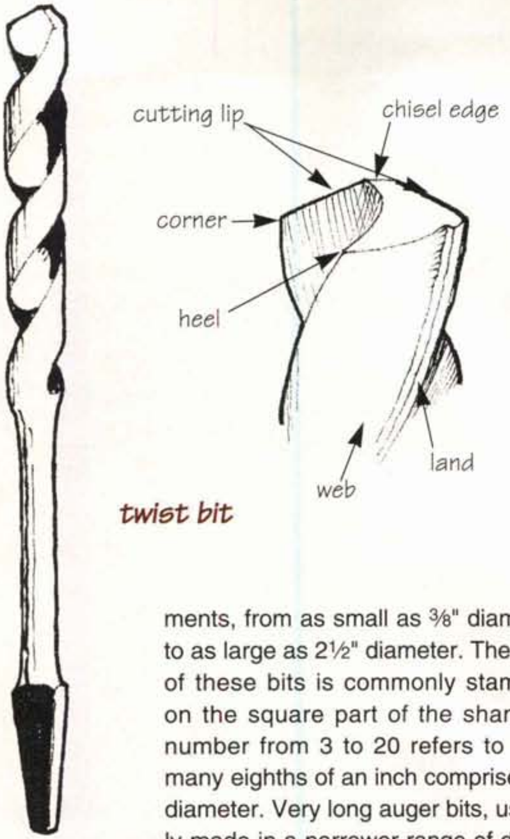
Auger Bits

Derived from the old word for *eye*, the word auger is used to mean *hole* as in the *eye of a needle*. Therefore, the term *auger bit* is almost redundant. What else would you use a bit for if not to make a hole? Nevertheless, it has become the name for one of the major classes of bits—those characterized by their twisted spiral form, usually with spurs to cut the fibers of the wood with one or two cutting edges to cut away the wood between the severed fibers, and a threaded point that pulls the bit into the wood.

There are single spiral (one cutting edge), double spiral (two cutting edges), and close and open spiral auger bits, as well as short auger bits (also known as dowel bits). All are made in a range of sizes, usually increasing by ⅛" incre-



brace bits



twist bit

ments, from as small as ⅜" diameter to as large as 2½" diameter. The size of these bits is commonly stamped on the square part of the shank: a number from 3 to 20 refers to how many eighths of an inch comprise the diameter. Very long auger bits, usually made in a narrower range of diameters, are sometimes sized in ¹⁄₁₆". Even higher quality bits were made in increments of ¹⁄₃₂".

The reason for so many types is because of the variety of material that might need to be bored. Finely threaded points on the end of an auger draw the bit more slowly into the wood and make cutting hardwood a little easier since less wood is removed with each rotation. Coarser threads pull the bit more quickly into the wood and result in a thicker shaving, ideal for softwood. A double–twist bit with two cutting edges has advantages over a single–twist bit with only one cutting edge when working with wood that is more or less seasoned. *Double*–twist also means two spurs, which make accurate scribing of the hole to be bored an easier proposition—something that can be hard to accomplish with an electric drill–driven spade bit.

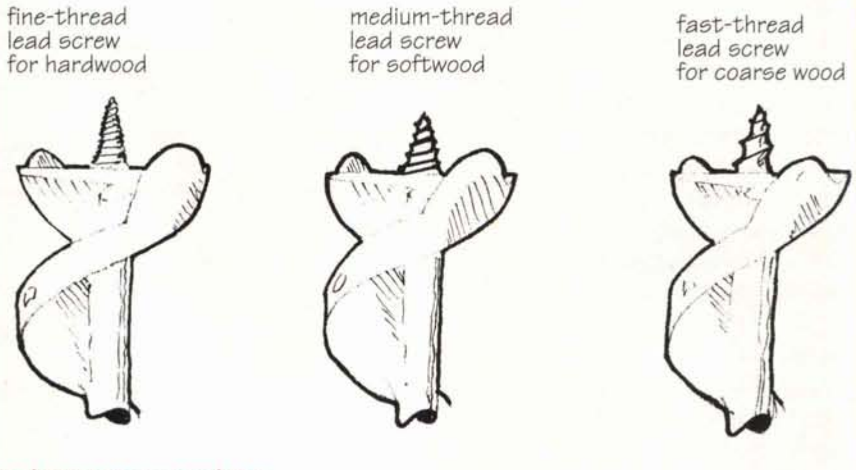
Being aware of these features will allow you to judge the condition of an auger bit beneath its dirt and rust. It *must*, of course, be straight. If it has been overly forced or otherwise abused, the bit may be bent. It is hard though not impossible to straighten a bent bit, but its integrity remains suspect. The bending and straightening may weaken it, and it may bend again, unexpectedly and with potentially dangerous results.

The all–important lead screw should not have been damaged by clumsy sharpening of the spurs or the cutting edges. An old trick for clearing clogged threads is to hold a clothes pin over the lead screw tightly while turning the bit. Using a fine thread in softwood or wet wood will clog the threads; so will not applying sufficient pressure when beginning to bore—the threads formed in the wood will strip out and fill up the screw so that it no longer bites into the wood but will simply spin.

The spurs and the cutting edges are not hard to sharpen using a small double–ended file with alternate safe edges known as an auger–bit file. But all too often the spurs will have been sharpened on the outside instead of only on the inside, the result being the circle scribed is narrower than the diameter of the bit. When sharpening the cutting edge or edges of the bit itself, it is important to keep them perpendicular to the shank. Inattentive sharpening will cause the edges to slope and not hit the wood along their length or together at the same time, making boring considerably harder.

The majority of holes bored with an auger bit will be perpendicular to the surface of the wood, which is what the tool was designed for; angled holes are more easily bored with a Forstner bit. Every woodworker soon learns a number of tricks to guarantee accuracy. Almost every old book on woodwork recommends boring with a trysquare stood on end near the bit to provide a reference for your boring angle, but it is hard to get the trysquare close enough to the bit for this to be of much use.

It is just as efficient to learn to use some other reference,



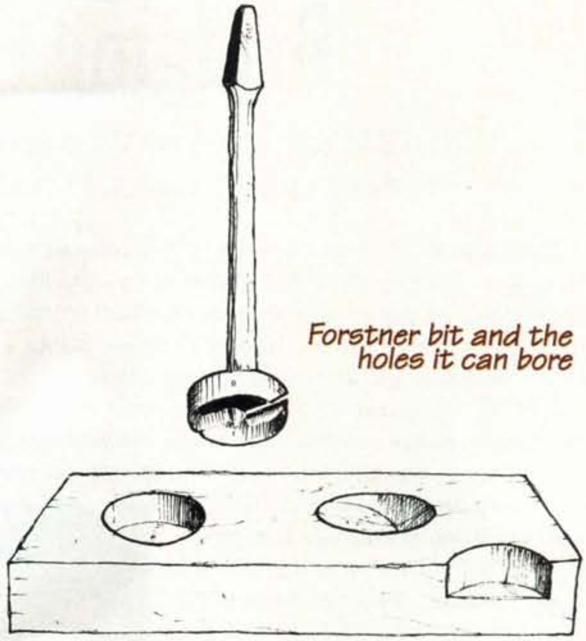
single twist auger bits

such as the surface of the bench or the wall glimpsed out of the corner of your eye. It also helps to position the workpiece so that the bored hole is either perpendicular to or in the same plane as the workbench because the eye has difficulty judging intermediate angles. How you hold the brace can affect the accuracy of the boring. It is almost always better to position the pad of the brace against part of your body—a thigh, your abdomen, a shoulder—so that it may be held perfectly upright or horizontal.

Other Useful Bits

Before auger bits the world of boring was filled with different designs such as gimlet bits, center bits, spoon bits, nose bits, caster bits, taper bits, and countersink wimbles. Some had screws at their tips but most did not. Many scraped rather than cut since they had been designed for boring tools that were reciprocating rather than fully rotational (like the bow drill or today's push drill). One of the most successful bits was the center bit which has a center point for orienting the hole to be bored, a spur to cut the fibers at the outside of the hole, and a sharpened cutting edge for lifting out the waste. Simple to use and maintain, they exist in a large number of sizes from 3⁄16" in diameter to 2½" in diameter. Their main disadvantage is their comparative shortness.

A larger group, second perhaps only to auger bits, is the twist bit family. Closely related to metalworking drills, these are made in a very wide range of finely graduated sizes, and exist both long and short. Very long versions used to be known as bell hangers' twist bits, and until recently were used by telephone linemen for boring holes for thin wire through walls. Many of these have a small hole bored through the tip in which a wire to be passed through the bored hole may be fixed (and then wrapped around the flutes of the bit) making it easy to thread the wire through a hollow space.



Forstner bit and the holes it can bore

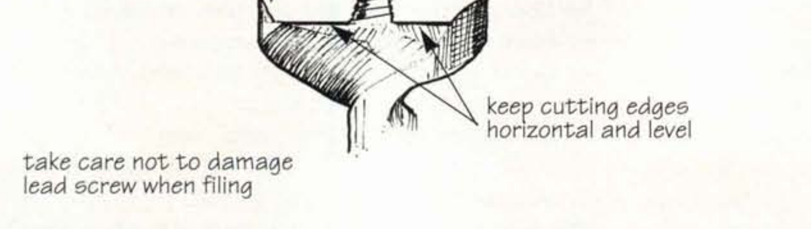
Most people think twist bits are intended for handdrills. In truth, only those with round shanks are meant for hand drills; square–shanked twist bits are meant, like all other square–shanked bits, for use in a bit brace. Round–shanked twist bits are designed to be held by the three, straight–faced jaws found in the chucks of most hand drills (and drill presses).

The geometry of the spiral flutes, especially on the tips of twist bits intended for woodworking, is different from that of metalworking bits. For a twist bit to work efficiently, it must be carefully sharpened at the proper angle. This is made easier if a jig is made (or a commercial jig is used) to hold the bit in the proper relation to the grindstone. The difference between a blunt or incorrectly sharpened bit and one that is in good condition can be astonishing. Learning to sharpen properly is well worth the effort.

A nice variation on the woodworking twist bit consists of a brad–pointed bit, made with spurs and horizontal cutting edges in the manner of good auger bits These tools are used for making smaller holes than a regular auger bit can produce. Because they lack the lead screw, they require a little more pressure to cut.

Of all the bits that can be used in handdrills or braces, the Forstner bit deserves mention. Its *spur* is nearly a complete circle and this allows it to begin boring a hole at virtually any angle without the bit walking away from the desired location. Unlike an auger bit, the Forstner bit provides an extra advantage in that it more closely bores a flat–bottomed hole. PW

sharpening an auger bit


auger bit file
sharpen only inside of spur
keep cutting edges horizontal and level
take care not to damage lead screw when filing

Bridging the Quality Gap

With a little luck and a lot of marketing savy, Bridge City Tool Works has become *the* source for custom woodworking gauges and measuring tools.

Some might call it fate or destiny but John Economaki chalks it up to being in the right place at the right time. Still, the fact remains that in ten short years this resourceful entrepreneur has turned his fine woodworking skills into a successful catalogue and tool manufacturing operation.

A story right out of the classic American dream, Economaki's trail of success began when his illustrous, albeit brief, career in fine wood furniture making was cut short by his doctor's ominous warning: "Get out of woodworking unless you want to be chronically ill for the rest of your life." To say the least, the irony that he had developed an allergy to the dust of the substance from which he made a living was a bit disconcerting,

While pondering the course of his future, John drew on what he knew best—woodworking and the tools he had used in his craft. Over his many years of wooodworking, both as hobbyist and professional, John had often been dissatisfied with the tools available on the market—simple try squares that weren't truly square, and the like. To remedy the inadequacies, he had designed and made his own. It then occurred to him that other woodworkers might be equally disenchanted. Thus blossomed Bridge City Tool Works, so named after the city of Portland.

What follows is an inspiring interview with John Economaki, president and owner of Bridge City Tool Works, conducted by contributing writer Ken Sadler.

What made you think that you could turn that idea into a business?

I wasn't sure that I could, but I thought it was worth trying. I have a very simple philosophy that life is for explorations, and I don't have this big master plan for getting rich and famous. I didn't do it with the furniture and I didn't do it with the tools.The first thing you have to find out is if there's a market out there to support your ideas, and that's what I did.

How did you go about that?

In 1982 I wrote to "Fine Woodworking" magazine and asked for a rate card to find out about their advertising rates. Then I went back three years and I made a chart of everyone who ran ads in the magazine. I assumed that people wouln't run ads if they weren't making money doing it, or at least they wouldn't repeat them. Knowing how much they were spending to run their ads, I charted all the repeat ads and thought that, at normal margins, they'd have to be doing a certain amount of volume. That got my confidence up, thinking I could sell a $48 item that maybe cost me $25 to make, and sell enough of them that I could at least pay for my ad. The cost of the ad, at that time was $2,000. The sales came in, and low and behold, I paid for my ad and that's about it. I got so excited about the whole process that I thought it was worth pursuing. It was blind ambition.

How many different tools do you make?

Right now about 26.

Did you design them?

Every single one of them.

Where did you first set up the tool business?

In the basement of my house.

Where do you get your materials?

We get them from all over the country. We buy our brass locally and we don't use exotic hardwoods any more. We use a material from Vermont. It's a domestic product, either birch, beech, or maple dyed with an aniline dye and impregnated with a phenolic resin. It's an amazing product for our purpose.

Do you perform that work here?

No, it's done in Vermont and we buy it in sheets of various thickness.

What percent of the cost of your products is the material?

It's a small percentage, most of the cost is labor.

How much did you invest in equipment at the start?

I owned a woodworking facility with a lot of nice equipment. With the exception of sanders, all of our equipment was built prior to 1960. I spent most of my spare time looking for good old equipment. I'm not including the metal working stuff. We work it just like wood with the exception of the heavy milling operations.

So how much money did you have invested in equipment when you started the tool business?

I'd say I had thirty five to forty thousand dollars that I'd accumulated over a six year period.

How much do you have invested now?

$250,000 to $300,000. One big machine was $150,000 by itself. We bought it about two years ago.

Has your wife ever worked as part of the business?

by Ken Sadler

No, except for saying, "You're going to do what?"

When you started the Tool Works you worked alone. How many people do you have now?

Thirty four.

Did you have trouble finding people you felt were good enough to produce your tools?

No. What we look for are people who have a desire to work with their hands and they don't necessarily have to be woodworkers. Your idea is that you want to train the people to do things your way. We break everything down into fundamental processes or steps and there isn't one single step that we do here that can't be learned by the type of person we like to hire.

> "People get upset when they go shopping and can't find anyone who knows enough about the product to answer their questions. When you call Bridge City, you can talk to a woodworker and that's the secret."

Then none of your people work a tool all the way through the process?

No. Don't get me wrong, we've got some very talented people now because people don't leave. Because of the labor intensive character of our work, there are human thresholds that we want to avoid because quality tends to drop if we exceed them. We have a very low turnover because we rotate people around. We have people who can make any of our tools from start to finish.

Do you provide any health care for your employees?

Yes, we've offered health insurance and a dental program for about three years.

When you started providing health care, was it necessary to raise your prices to cover it?

No, we just did it for the employees. The basic try square sold for $48 in 1983 and it sells for $52 today, ten years later. That's a phenomenally small increase when you consider the price changes in most other things during that time. Next year we're going to have a substantial increase in all our prices because we have not kept up with the erosion of our margin base at all.

Do you ever subcontract some of your work?

Any part that can be made on a screw machine is subcontracted. You break down each tool into a series of parts and you set up routine procedures to make each one of those parts. Our minimum run on any given item is around three to five hundred but some are as many as four or five thousand. The run sizes are set up at the beginning of the year.

I get together with the marketing department and we work out our sales forecast for the year. We take each tool and, depending on the total quantity of it that we expect to sell and the seasonality of the demand, determine when those sales are going to occur. We want to get ourselves into a position where we're not out of stock, especially during the holidays, then we plan four or five runs on that tool during the year. We won't do them all at once. When they have been figured in this way, we get together with manufacturing and tell them what we have to do about current tools. I have a four-year schedule of new tool introductions all planned out. These are new tools in addition to our existing line. We have not introduced a single tool that we have taken out of production and we don't plan to.

They all sell well enough to keep producing them.

That's exactly right. They just keep selling and selling. The current tools go into the schedule, the new tools go into the schedule, and from this we figure out how many people we have to hire to get the schedule done.

What was your marketing strategy in the beginning?

I wanted to sell direct because I did not want to turn the most important aspects of my business over to strangers. I knew I had an expensive product and that there would be resistance. I would show the tools to people and they would say, "They're beautiful but who's going to buy them?" The market wasn't big enough in this town alone. I needed to find out if the national market was big enough, and how many people would it take to hold us up?

I was the world's foremost expert on my product. I knew why it looked the way it did, what it did and what it couldn't do, and I wasn't ashamed to tell people about it. So, we ran our first ad and I got a lot of requests for catalogues, which I didn't have. The first ad featured two tools and I knew you couldn't print a catalogue with two items, so I designed three more and published my first catalogue. We printed 2500 copies and they cost me $2.50 each. I had a whole bunch of tools that I wanted to build, so the original catalogue was a series of cards in a very beautiful embossed folder, then as we added tools, I could just mail my customers a new card.

Well, I didn't know anything about printing and I didn't know how that expense was going to kill me. I was totally naive. I just wanted to get it done, so of the few dollars that I made during the first four

or five months that I had been in business, I spent six thousand dollars on the catalogues and I was back down to zero again. I had thrown my $2000 from my first ad back in and I had been advised that you can't run a space ad just once, you've got to repeat it at least three times. Well, I didn't have the money to repeat it three times, but I knew that the following fall I would run that ad three times come hell or high water.

As far as I'm concerned, in any successful business there are many reasons for its success. I was the right guy at the right time in the right spot. I think there is large element of luck and I had my share—that's why we're here.

In the early 80's there was a big growth in woodworking as a hobby which paralleled the bubble of baby boomers who were just reaching a point in their lives where they had some spare money and wanted to pursue a hobby interest. This caused a growth in the demand for woodworking tools and supplies. At this time, and this is what I call being in the right place at the right time, I heard of a woodworkers' consumer trade show in San Francisco. I took my five tools down to San Francisco, rented a table and sold my tools over the counter. What I learned from that experience I'll never forget—I got to see the people, face-to-face, who were buying my tools. It is absolutely the most important thing anybody can ever know in business—who buys your product. It's as simple as that. You can't get anywhere if you don't know who's going to buy what you make.

That show worked out well, I took in $2,500 in two days. I found out that there was another show a week later in Pasadena, I went down there and had people clamoring to buy these five items. I took in $5,000 and I knew I had a market. More important than knowing who my customer was though, was knowing who my customer wasn't.

After that, all of my advertisements were directed to who my customer was. People would ask, "Can I have a catalogue?" and I learned right away to answer, "No, it costs a dollar." That turned out to be a smart move because I was able to qualify my potential customers. If he was willing to part with a dollar for my catalogue, he was more apt to be a serious prospect for our tools.

You now have a big mailing list and you built that list through those ads.

Ads and trade shows. I realized six months into it that this was a computer business. I knew it in 1983. I knew from the volume of mail that I was getting, which was only about 200 letters, that the note card system I had started was not going to work. Today the computer is the only way to maintain a large mailing list and keep track of the orders it produces.

Do you still participate in shows?

Yes, we do them because it's important to maintain a face-to-face contact with our buyers. It's important to get new customer leads. In 1985 trade show income was 90% of our revenue. Whereas now, eight years later, it's down to about four percent.

It's dropped in percent of total sales, but has it dropped off in dollars?

Our income per show has gone way up. The least expensive way to find out if you have a viable product is to find out which trade show covers your product and do one. Otherwise you could languish in obscurity trying to work through dealers. You can get a hundred dealers who will buy two or three to test their market and all of a sudden you need a set up back home to handle all these dealers. Then when you start placing ads and selling direct the dealers complain that you're taking business away from them. Yet they haven't sent you any appreciable amount of orders. What seems to be happening is the slow dismantling of the middle level of distribution. It doesn't work anymore. It's the same reason people get upset when they go shopping, they can't find anyone who knows enough about the product to answer their questions. When you call Bridge City, you can talk to a woodworker and that's the secret.

You call these trade shows, but you're not selling to the trade, you're selling to the ultimate consumer.

They're called retail or consumer trade shows. They really are a consumer show, the name is misleading.

It would appear the shows bring in woodworking hobbyists much more than professionals.

Exactly, and the reason is that the hobbyists outnumber the professionals ten to one. So you've got a much broader market potential right off the bat.

How do you set prices in the beginning?

We made the tool, looked at what our material costs were, what our labor component was, looked at the overhead, added what we thought was a reasonable profit margin and that's where the price fell. I have never designed around price. We have a tool that sells $169, it's entirely hand made. As far as pricing and price structure is concerned, it's just where an item falls. One of the enviable things about Bridge

City is that we created this niche and we dominate it. We're reasonably confident that no one can come in under us with out sacrificing quality, which is why people buy our tools.

Our gross profit margin is reflective of catalogue marketing in general. When you own 100% of a company, and you do it right, you're going to get paid somewhere down the road. You don't have to take it up front, and that money can multiply itself many times over. I lived on a shoestring and put what would be a good salary for me back in the business.

The point is, when beginning a small business, you must recognize the difference between salary and profit.

Exactly, you're starting from scratch and there is no salary.

Yes, but you have to charge it to the business whether you take it or not otherwise your costs are not accurate.

That's right, you get a false sense of security because you have very low overhead. My point is, we grew at such a phenomenal rate that, in addition to the profits, I was able to throw that salary back in. I was able to do that and build the company. Until last year, we never grew less than 68% per year.

> "I never did it with a master plan. I did it because I was having fun. I'm always amazed at people who have two, three, or five-year plans, just like the books tell you to do, and they don't have a single customer."

How long did it take you to start making a living from the tools?

Four years. I started in '83 and in '87 I was making a salary.

What are your present gross annual sales?

Last year they were right around $4 million dollarsthis year, our 10th year, they will be about $2.5 million. It should have been about $5 million this year, but because of a change in federal bank regulations, we did not meet the qualifications for our line of credit which we needed to produce the catalogue. That sent us into a tailspin. We had to cut our work force by 30% just to keep going. How many catalogue companies do you know that can go a year without a catalogue?

The bank refused to renew your line of credit?

That happened to us and thousands of others across the country. We've heard from so many people who sympathized with us. Our customers are what pulled us through, though. This year we've had to concentrate on our own products and we send out "sneak preview" flyers to our existing customers. We still take orders from the 1992 catalogue. Our next catalogue is scheduled to come out this fall and we are able to produce it without the line of credit. (*ed. note: Bridge City Tool Works was featured in a story on ABC Evening News with Peter Jennings, Dec. 1, 1992. The story focused on the devastating impact of the national banking crisis on small businesses across the country.*)

How many catalogues do you mail and do you mail them once or twice a year?

We mail them four times a year. Last year we mailed 1.2 million catalogues. That's the total of all four mailings.

Do those catalogues change?

No, we publish one catalogue a year but we change the covers when we mail them to different sectors at different times of the year.

We mail to segments of our in-house file four times. It's all part of what we call data base marketing. You want to mail literature to people most likely to respond. Your "most likely" next buyer is your last buyer, the "next most likely" buyer is a person who makes multiple purchases, then the next most likely buyer is someone who's spent a fairly large amount of money on mail order purchases. So, you break out your mailing list into these little pools and you determine pool A, your hot list, is going to get four catalogues a year, pool B will get three, and pool C will get two. Then your inquiries, the people you haven't sold to yet, are going to get one. If you don't plan it this way you're just pouring money down a hole.

Where does the business come in?

There's a whole lot more to starting a business than the product itself. Most people who think they have a great idea, don't understand that the bulk of their time will be spent doing things other than what they like to do. The old saying, invent a better mousetrap and the world will beat a path to your door, is misleading. I'd like to add to the phrase, "if they know where you live." And knowing where you live involves a lot more than just giving out your address. Giving out your address is, in fact, a marketing activity and that's where it starts.

As far as Bridge City Tool is concerned, I never did it with a master plan. I did it because I was having fun. I'm always amazed at people who have two, three, or five-year plans, just like the books tell you to do, and they don't have a single customer.

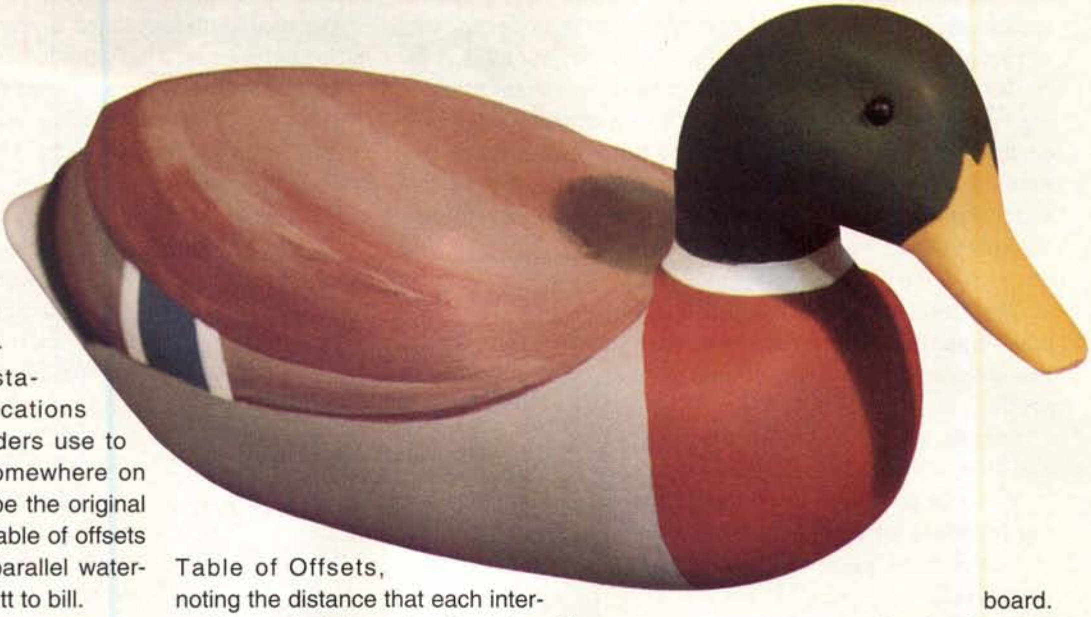
We're a ten-year-old company and we have never had a budget. Up until about six months ago, I never paid any attention to financial statements. Now that's all changed, we're highly focused and all those things have meaning to me, but in the growth phase of a fast growing company, I think you're better off not looking at them.

This story is about a tool company, but it could just as easily be about a wood products company. The steps John Economaki took and the solutions he devised to the problems he encountered can be adapted to any woodworking business. Behind those steps and solutions however, were John's self-discipline, self-confidence, and enthusiasm. PW

LOFT A DUCK

by Garth Graves

If mother nature had been a naval architect, the design known as 'duck' would have been defined as a series of vertically stacked lifts and evenly–spaced sections marking off the horizontal axis known as stations—the same demarcations designers and boat builders use to loft a sleek hull form. Somewhere on her workshop wall might be the original duck half–model, and its table of offsets that pinpoint the duck's parallel waterlines, and stations from butt to bill.



Lofting History

In days past and BC (before computers), ship designers would carve a full or half–section model of the desired hull shape. Once the wooden block was formed and faired, the scale model was then dissected to define the lines, and ultimately to loft the design into a full–scale version. To accomplish this, the half–model was physically or theoretically divided into equidistant lines parallel to the ship's waterline. These are known as lifts. The length of the model was divided into numbered stations along the hull length.

At each waterline lift of the scale model measurements were taken athwartship, perpendicular to the centerline and out to each point where lift and section lines intersected. Two other sets of lines, diagonal and buttock (not shown here), provided more shape definition. Diagonals were drawn through *the front* view body from the centerline plane to the horizontal plane, and buttocks were sections or slices outboard and parallel to the centerline that provided additional intersecting points which further defined the hull form.

Measurements were recorded in the Table of Offsets, noting the distance that each intersecting set of lines is offset from the centerline along each waterline lift. Because the hull is symmetrical, the dimension would be noted in half–widths to be lofted to both port and starboard defining the full–size shape for the builder to construct. Station cross-sections (less the thickness of the planking) could be cut or formed into frames that, when spaced evenly along the keel line, defined the skeletal form.

Onto the Duck

Luckily our process is not that complex. What we are doing here is reducing the design to two basic parameters, then rebuilding the solid shape by stacking lifts cut into its plan view, then aligning and gluing them together for carving and fairing the lines to the duck shape. By using these age–old steps from marine design to define the body shape, even the novice woodcarver is guided through the shaping process by the cut–to–shape lifts. For duck hunters in the group, the shape has not been tested in the wild, but I assume that the shape would be suitable as a real McCoy decoy.

Lifts and Stations

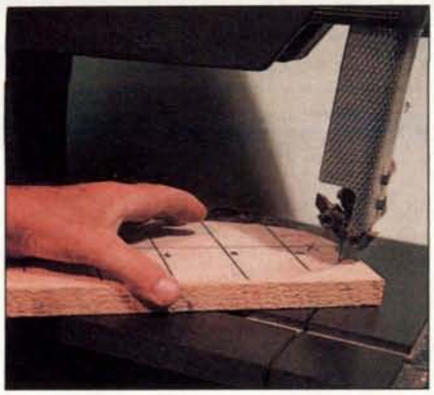
In this design, the duck's lines are based on standard milled wood thickness—1" wood surfaced to net ¾" thick board. Designing to this standard dimension, the stacked boards of ¾" stock will net the overall body height. The form evolves as you fair these stair–stepped shapes back to the cut perimeter of the adjacent lifts, and the material between stations along the length.

Each lift has both an upper and lower plane and may be widest at the top or bottom plane, or between the defining lift lines. The plan view of each lift must be large enough to capture the larger of the upper and lower planes and the maximum width that occurs within the lift thickness.

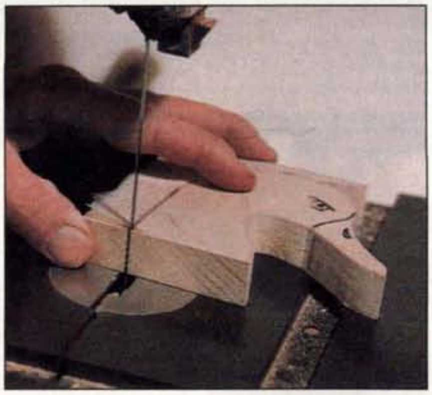
This decoy is 13½" long, but the size can be altered easily by having the plans reduced or enlarged at your local copy center or blueprinter. Just remember to resaw or buy wood in a thickness equal the distance between the lift lines on your working size drawing.

Use basswood, clear pine, or another soft low fibrous wood. Carving is faster and easier if you stay with these softer woods, and easiest if you use basswood, which is homogenous with no discernible fiber (grain) direction. If you want an unpainted decoy, or maybe to combine varnished with painted areas, an alder or clearheart redwood, or one of the softer mahoganies such as Philippine mahogany, would produce a fine decorative piece.

***Garth Graves** has contributed designs and articles to several woodworking magazines. He is the author of* The Yacht Craftsman's Handbook *(McGraw Hill, 1992)*



Transfer the lines to your stock, then cut the lift profiles.



Cut the head pieces so that the grain runs 90° to that of the lifts.

Transfer station lines to the verticle thickness of each lift.

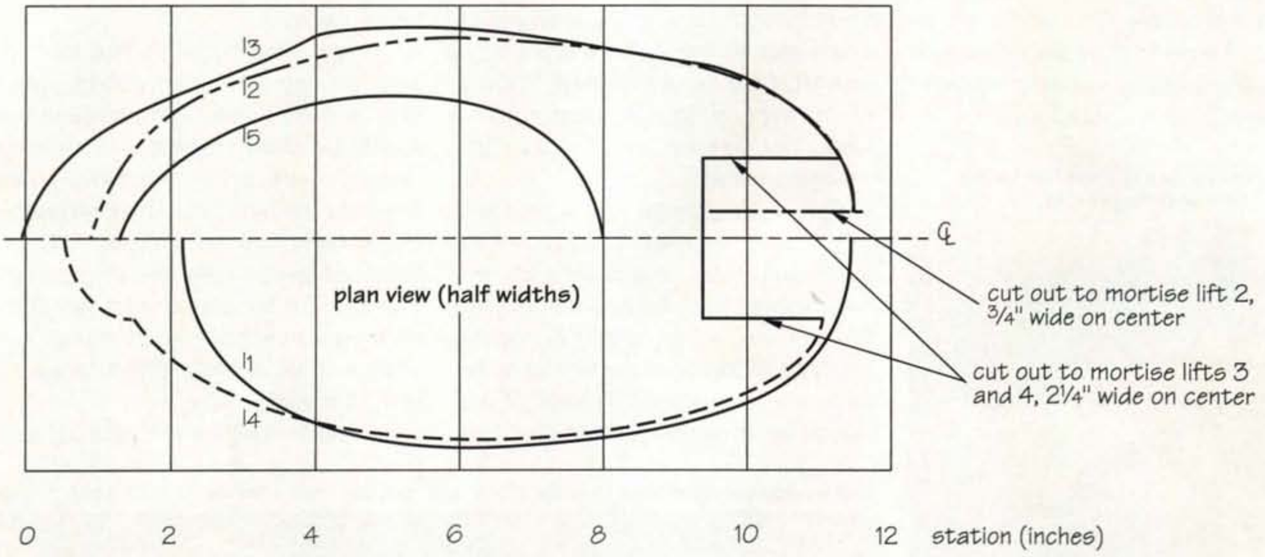
Before Cutting

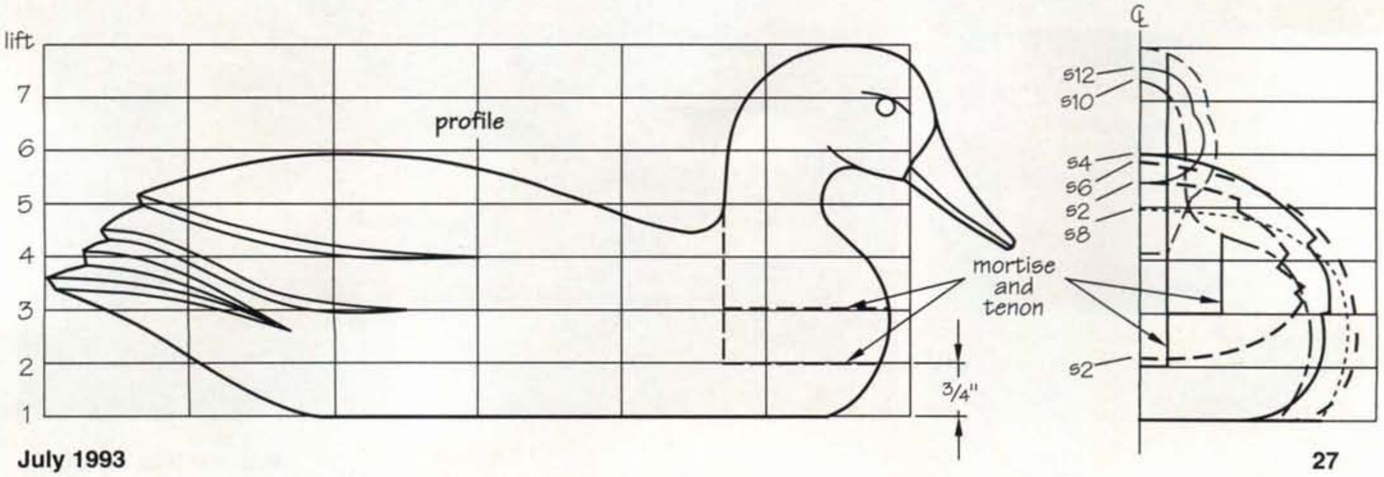
Two assemblies make up this decoy project—build the body from five ¾" thick lifts, oriented horizontally. Make the vertical head, bill and breast assembly from three glued–up pieces of the same ¾" thick stock. The body lifts are mortised to receive the tenons of the head assembly as shown in the Figure below. The center piece of the head provides the main tenon support, extending into lift 2 where it glues to the top surface of lift 1. The flanking head pieces are cut ¾" shorter and fit into lifts 3 and 4, gluing to the top surface of lift 2.

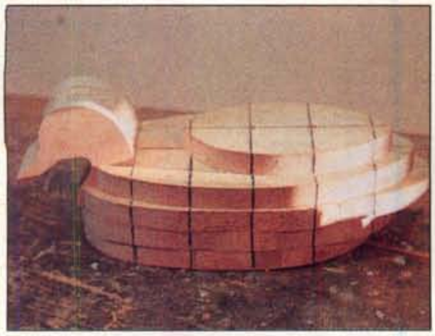
The grain direction of the flanking head pieces should be oriented 90° to the center member for added strength at the more vulnerable bill.

Transfering Lines

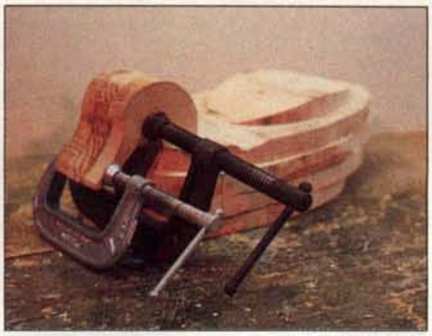
There are a couple ways to transfer the pattern to the wood stock. First, using the pattern sheet, trace the lines of each lift onto its respective wood stock using carbon or transfer paper. Repeat the process to the opposite side of the centerline. Another method would be to fold a sheet of tracing paper or vellum, forming the centerline,


l3
l2
l5
℄
plan view (half widths)
l1
l4
cut out to mortise lift 2, ¾" wide on center
cut out to mortise lifts 3 and 4, 2¼" wide on center
0
2
4
6
8
10
12
station (inches)

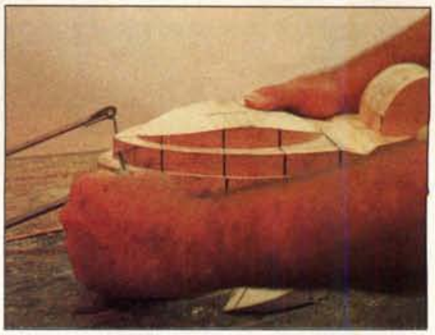




Align, glue and clamp the lifts to form the body.



Fit the three head pieces in to the mortices cut into the body.



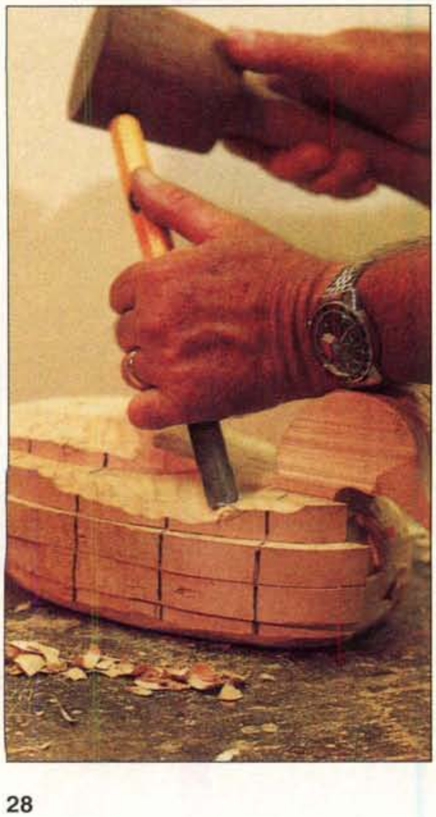
Saw away the major waste—taking care not to remove too much stock.

lay this along the centerline of the pattern and trace the half width on the folded sheet of paper. Cut the pattern while the paper is still folded. Then open the sheet to provide the symetrical full–width pattern.

Cutting the Lifts

Use a hand fret or coping saw, or power saber, scroll or bandsaw to cut slightly outside the outline of each lift. Transfer the major lines shown in the pattern to the lift blank. These include the centerline and reference station lines across the top surface and down the sides (thickness) of each lift. These marks are used to align the pieces during assembly/gluing, and later to define the shape at each station location.

Fair each lift into adjacent lifts using chisels, knives or wood files.



Gluing the Assembly

Glue the lifts together with a quality woodworker's glue, or an epoxy if you want a waterproof bond. Align, glue and clamp pieces together until set. Pieces can be clamped using a woodworker's vise, C–clamps, or simply weigh down the glued pieces with a spare anvil or other heavy object—be sure a shift doesn't occur in the alignment.

Carving

The method used is the same as that for carving a ship's half or full hull model. Begin carving the material by fairing each lift into the lines of the adjacent lift. Chip carving knives, chisels, wood rasps or Stanley Surform and sandpaper will soon bring the blank into the desired shape.

Carving progresses from coping saw cuts to achieve the general profile, to a gouge and mallet (or a chisel and hammer), knives, then flat and round wood rasps. The rougher carving brings the form into shape, then the less abrasive rasps and files should be brought out. Larger wood rasps and files then give way to the small warding or modelmaker's files.

A faster approach might involve a portable grinding tool, or a flexible power shaft, equipped with a similar selection of rotary files and burrs to make quick work of the shaping. Caution is the watchword. It's very easy to get caught up in the flying wood chips and carve beyond the designed shape. While a drum or disk sander can be helpful in shaping the project, they too can be detrimental to the shape. Use these aids with caution. and with a light touch. Finish off with hand work for ultimate control.

As you are forming the decoy, whether using knives, chisels, wood files or power tools, keep in mind the roundness of the shape and of the symmetry you are trying to achieve. Take down the shape a little at a time, working one side then the other, to ensure a balanced, aesthetically pleasing design. You can cut templates from the body cross–section drawing to check the shapes at the different station locations along the body.

Do the final fairing and shaping with

Use wood rasps and files to make clean, well defined layers for the tail feathers.

varying grades of abrasive (sand) paper—starting with heavier 80–grit, then working toward finer grits of up to 200 or so. Long ago I adopted the habit of folding ¼ sheet (or smaller) of sandpaper into thirds. This produces an interleaf that is easy to handle because the grit of the sandpaper folded to the inside helps hold the paper together as a unit while sanding.

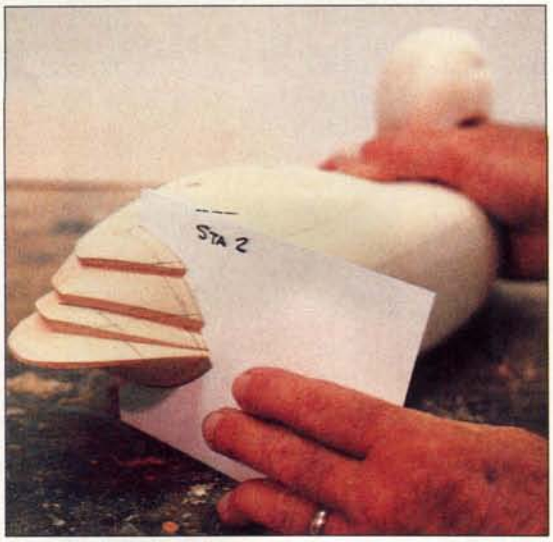
Pay close attention to the layering that occurs at the wing fold and tail shown on the plans. These feathered layers can be carved or filed away. Transitions from the vertical to horizontal can be carved, or formed by rotating a rectangular, triangular or square wood rasp along the surfaces form the side then rotating up and onto the top-facing surfaces. As you begin forming these transitions, the advance and rotate motion of the wood file will come naturally to form the varying planes.

If your shop is not equipped with a variety of wood rasps and files, you might consider buying a set of smaller hobby files. Such sets include round, diamond, rectangular and square files perfect for smoothing and contouring details on this, and future projects.

After the basic shape of the body and head are formed you have the option to continue surface carving to indicate feather detail and orientation. This final step using files and an X–Acto™ knife will add realism.

Eyes

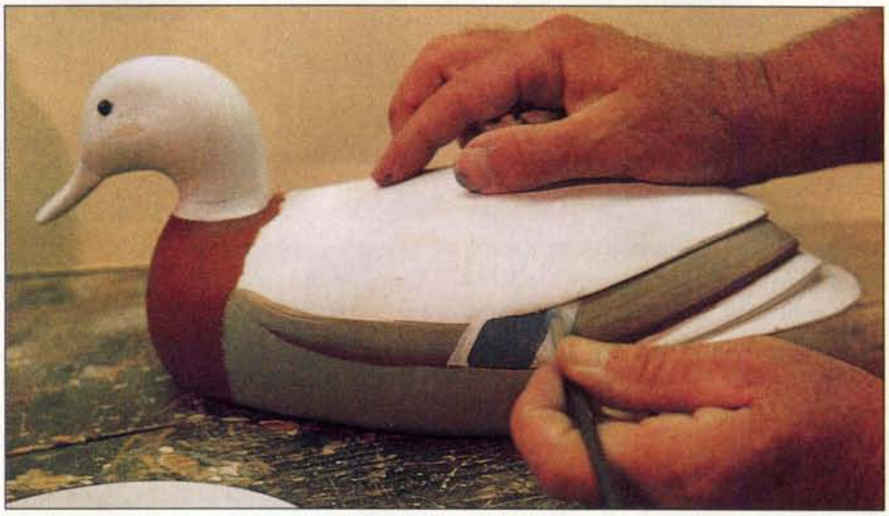
Black plastic or glass round–headed pins, measuring ¼", are used for eyes in this decoy. Glass beads or shanked buttons may also be used. Drill a pilot hole to press–fit the pin or shank, then counter–bore a hole a little less than half the diameter deep to inset the round–headed pin into its socket. Locate the position for the opposite eye so the duck looks intelligent, then repeat the process. Bird eyes may be found in decoy shops, but most shops won't sell them without their accompanying decoy blank. Animal eyes commercially available in hobby shops tend to be of the teddy bear variety.



Trace and cut templates from the end views to check cross sections at critical stations.

Finishing

Use a wood filler to fill any open joint lines or errant gouges. The decoy can be finished clear or painted in the colors of the Mallard drake. If you varnish, use a sanding sealer to prepare the surface and fill the pours and otherwise get ready for the final finish.



Overcoat the body with gesso, then paint the body from the bottom to the top.

If you elect to paint, I recommend acrylic colors which are available in small bottles just right for this type of project. For the undercoat, artist gesso provides a good smooth base. Because gesso is water–based some lifting of the grain may occur in the initial coat, but by lightly sanding between coats, the second or third coat will be smooth and ready for applying the colors.

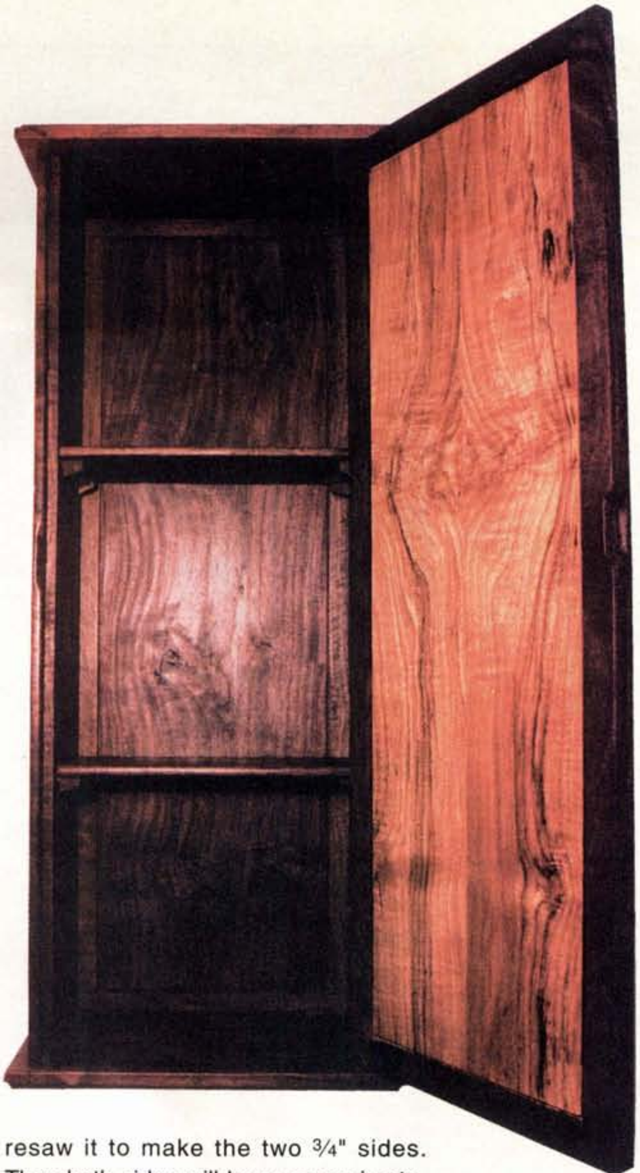
Your local library has resource books on bird coloring and markings. Select a combination that is to your liking. For the Mallard drake pictured here I used the colors under the brand name Ceramcoat, by Delta™. The colors pictured are: *Butter Yellow*—duck bill, *Dark Forest*—green head and tail feathers, *Mexicana*—reddish brown breast, *Liberty Blue*—wing marking, *White*—wing marking, neck ring, and tail feathers, *Spice Brown*—blended with *Grey* on wings and back, Cadet Grey—under body (and blended with Brown on wings and back).

All but the last two colors are used as–is, straight from the bottle. To indicate the feathering on the back and folded wings, mix the Spice Brown and Cadet Grey in tones ranging from dark brown to light grey. Brush in the direction of the feathers, and in light–to–dark shades, continuing the carved lines of the folded wings forward toward the breast and neck.

Overcoat the painted decoy with a matte acrylic as a protective finish. The decoy can be left bright, or antiqued if an aged look better suits its future home. You might want to add a large felt pad to the bottom or several smaller pads to protect furniture.

By breaking down the shape into this series of lifts and sections, a la lofting, the woodcarver is sure to capture the form of this Mallard decoy. And, since decoys are becoming collector's items that appreciate in value, you have just added $200 to the value of your personal property. Enjoy, and don't forget to sweep up the wood chips from around the kitchen table.

A Simple Cabinet



by Ken Sadler

This cabinet displays the true beauty inherent in wood. If you're careful when you choose the wood for this piece, you can create a work of art as beautiful as any done by a sculptor or painter. The centerpiece of the cabinet is the door panel. I discovered the wood used in the door panel while working on another project. I saved it and later designed this cabinet around it.

You can do the same. The dimensions in the drawings are not fixed, but can be altered to accommodate whatever you find for your panel. Interesting visual effects result from the book matching technique I used here. The wood you choose for the rest of the cabinet should be in sharp contrast to that of the panel. To obtain as interesting a grain pattern as possible, find the pattern you want in a 2" thick piece and resaw it to make the two 3/4" sides. Then both sides will have approximately the same pattern.

The most difficult part of this project is finding the right piece of wood. After that it's pretty straightforward cabinetry. There are, however, a couple of interesting departures from the ordinary. The door hinge is one and the arrangement for opening the door another.

The Case

The two most important parts of this cabinet are the top and bottom (A). If not done correctly, you will never be able to square up the case. What's critical are the dimensions of the area left after you cut the rabbets (Figure 1). They must be exactly the same on both parts. The shoulder of the side rabbets positions the sides, and the shoulder of the front rabbets positions the door.

Cut the parts to their overall sizes and joint or plane the top and bottom faces smooth. The rabbets are best cut on the table saw. Use a high auxiliary fence and a planer blade—a table saw blade with hollow ground teeth and no set which gives a very smooth cut. Set the fence 1/4" from the inside edge of the blade, *and the*

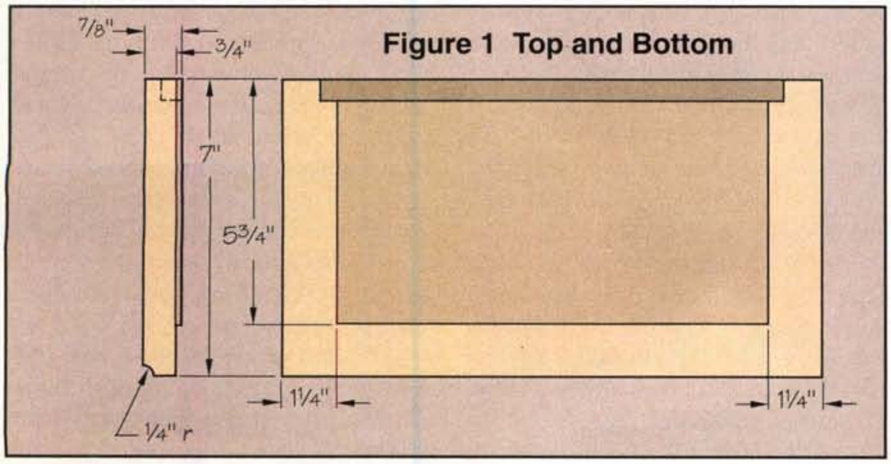


Figure 1 Top and Bottom

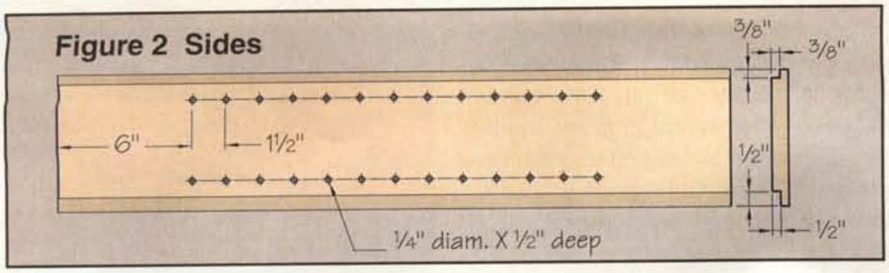
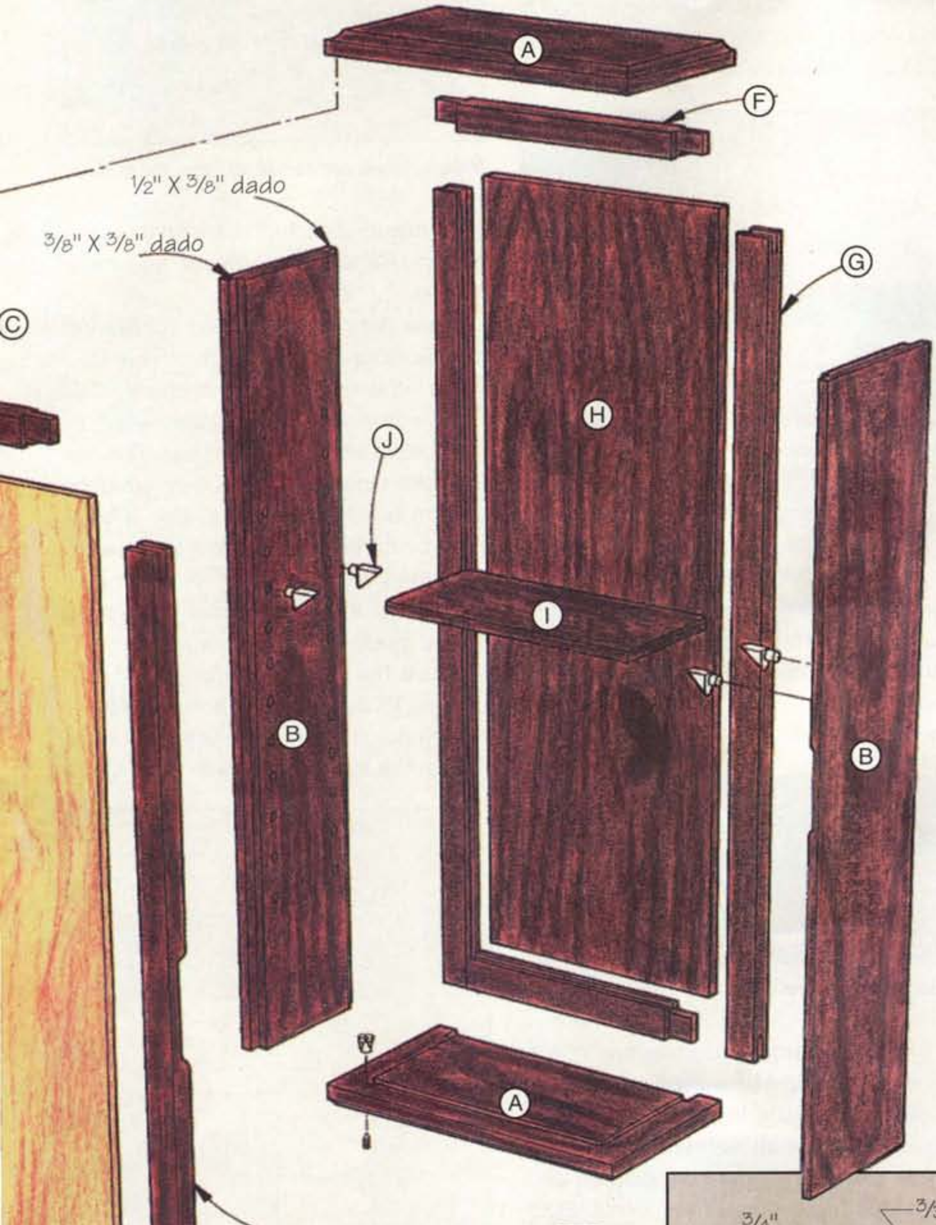


Figure 2 Sides



A Simple Cabinet					
		Finished Size			
Qty	Part	T	W	L	Piece
2	A	⅞"	7"	12½"	top and bottom
2	B	¾"	6⅛"	30"	sides
2	C	¾"	1"	10¾"	door rails*
2	D	¾"	1"	29 15/16"	door stiles*
1	E	¼"	9½"	28¾"	door panel
2	F	½"	1"	10¾"	back rails*
2	G	½"	1"	30¾"	back stiles*
1	H	¼"	9½"	29½"	back panel
*	I	¼"	5 3/16"	9 15/16"	shelves
*x4	J	¼"	¾"	1⅛"	shelf supports

* see text

blade height to 1¼". Test the setup with a piece of scrap. Cut the side rabbets first; then the front. If you've been careful to cut both the top and bottom to the same overall dimensions, the result will be right. Check it to be sure, and if there's a discrepancy—correct it now. Cut the moulded edges on both pieces. Use a ¼" core router bit. A ball bearing guide on the bit is better than a pin guide. In my experience, the pin guide invariably leaves burn marks you have to sand out later.

Cut the sides (B) to size and mark the inside faces and the front and top edges (Figure 2). This is important because the front and rear rabbets are different. Cut the rabbets; then lay out and drill the shelf support hole pattern as shown.

The case is held together with doweled joints. To get the necessary accuracy and proper positioning of the parts for this joint, construct the simple jig shown in Figure 3.

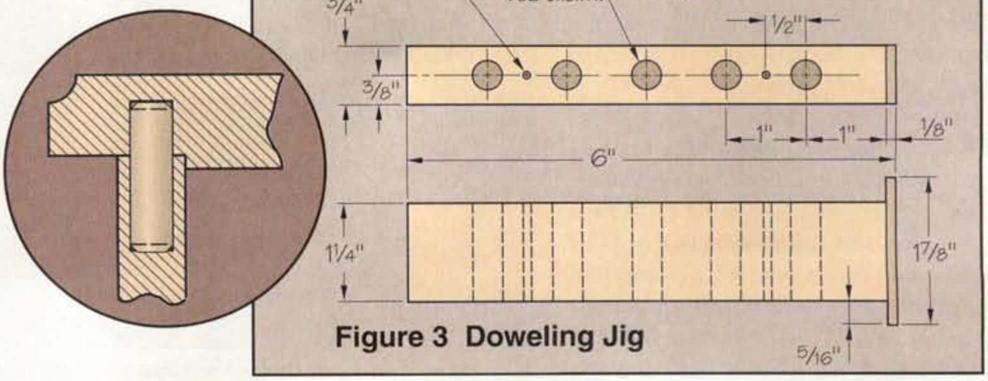
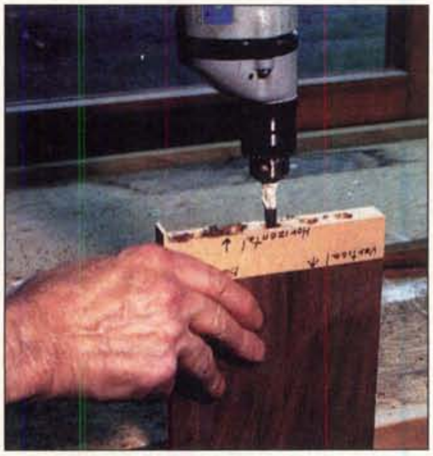


Figure 3 Doweling Jig

Mark the jig as shown so to eliminate any confusion when you use it. Mark the sides with chalk to indicate the inside face and the top, bottom and back edges. Place the jig on the top edge of one side with the gauging piece at the back and the side of the jig flush with the inside face of the side. Accurate positioning here is important. Push two #6 finishing nails through the small holes and tap them into the side far enough to hold the jig firmly in place as shown in the photo below.

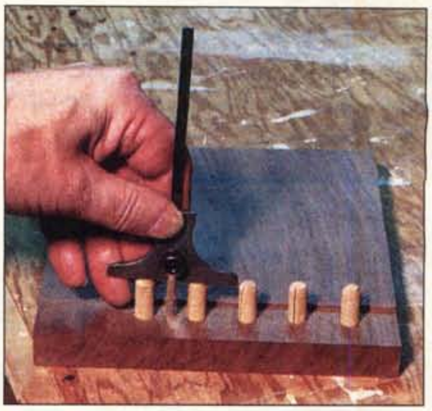


Drill one set of matching holes at a time.

Use an electric drill and a 3/8" brad point bit. Drill all five holes 1/4" deep. Remove the jig and pull the nails completely out. Push them in from the other side, and position the jig on the matching face of the top—with the gauging piece at the back and the same face that was on the inside of the side tight against the shoulder of the rabbet. Tap the nails home to hold the jig in place. Use a 3/8" bit in the drill press and drill all the holes 1/2" deep. Drill the other three joints the same way.

Follow this positioning procedure carefully or the holes in the top or bottom and the sides won't match. I recommend drilling each joint completely. Don't drill all the side holes, then the top, then the bottom—one mistake and the holes won't match.

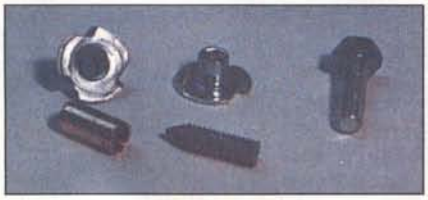
Cut twenty dowels 13/16" long. Slightly taper each end and put one or two air escape grooves down the sides. They should be a firm hand push fit in the hole. Now dry–assemble the case. Push the dowels into the top and bottom holes until they bottom. Use a depth gauge to check the length of the protruding end against the depth of the hole it fits into as shown at right. If one's too long, trim it. Assemble the sides to the top first, then the bottom Be sure everything fits properly and the two parts of each joint go together completely. Square the case—if you can't, make adjustments until you can. Turn to the back and mark the limits of the rabbet in the top and bottom to match the ones in the sides as shown below. Cut the rabbets 1/2" X 1/2" deep.



If the dowels are too long, trim them now.

Mark the location of the rabbet in the top and bottom after assembly.

The top hinge is a 1/8" diameter steel pin pressed into a hole drilled in the top edge of the door as shown in the hinge detail (Figure 4). The bottom part consists of three pieces, a 1/4" T–nut, a short piece of 1/4" i.d. copper tubing, and a #20–1/4" X 1" steel bolt with the head hacksawn off, see below.



Hinge hardware.

File a sharp point on one end of the threaded piece—be sure it's centered. Cut a slot that's big enough for the blade of a small screwdriver in the other end. Screw the bolt, pointed end first, into the bottom of the T–nut. Hold the T–nut face down as shown below and screw the bolt into the nut until the point makes a distinct mark on the case bottom. Repeat the process and mark the top.

Locate the holes for the hinges accurately.

Take the case apart and cut the top and bottom rabbets with a router—square the corners with a chisel. Drill the hinge holes just marked—3/16" in the bottom and 5/32" in the top. The top hole does not go all the way through, but the bottom hole does. Use a brad point bit for the larger hole it won't wander from the mark. Finish sand the four parts now. It's much easier than after you've glued them together.

Glue the case together—put the dowels in the top and bottom pieces and make sure they bottom. Put glue only in the top third of each hole. Don't

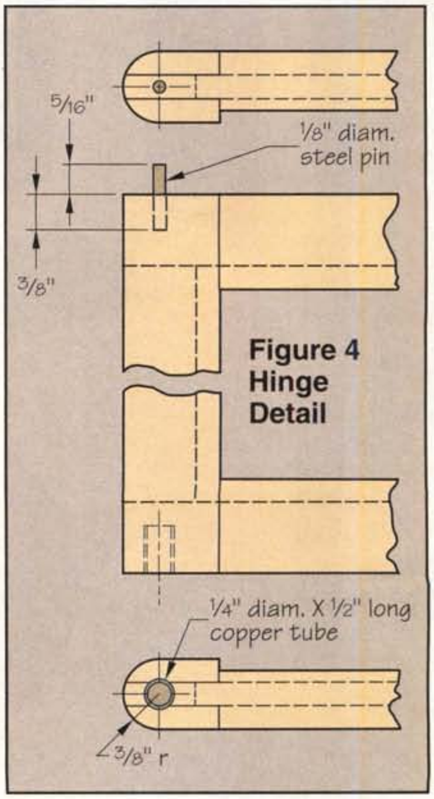


Figure 4
Hinge Detail

apply glue to the faces of the joints. Before you put glue in the side holes, *check the length* of each dowel. Finish the assembly. Square the case, clamp it if necessary, and set it aside to dry. Then install the T–nut. Insert it from the top so the flat head acts as a bearing for the door. Take it easy, but be sure it goes in all the way as shown below.

Make sure the top of the T–nut is smooth.

The Door

The door is simple to construct but there are a couple of details that require attention (Figure 5). The stiles extend past the rails and the rails are thinner than the stiles. Do not cut them thinner until you've cut the mortises and tenons and the door fits together properly. We'll install the hinge system after the door is finished.

Do not build the door to the overall measurements in the Cutting List—measure the door opening in the case first. The door must fit snugly into the rabbets on the front edge of the sides and is 1/16" shorter than the top to bottom dimension. Cut the rails (C) and stiles (D) to length from the case measurements. Also cut a piece 10" long to make test cuts. Mark the outside edge of each piece with chalk and cut a 1/4" X 1/4" groove in the exact center of the inside edges. Do this on the table saw with a dado blade and a high auxiliary fence. Measure the distance from the bottom of the groove to the outside edge of the rail, and raise the dado blade that distance above the table. Cut the through mortises in the ends of the stiles.

Make the tenons with two cuts. Make the first with the piece flat on the table and the blade set 1/4" high. Set the rip fence to the length of the tenon—measure to the outside of the blade. Cut both faces. Then cut one end of the test piece in the same manner. The second cut is vertical so use either a jig or the freehand method. If you have a wide blade slot in the saw table insert, it is safer to use the jig. If you do it freehand, set the blade height to the lower edge of the horizontal saw cut. Set the fence 1/2" from the inside of the blade. Make the vertical cuts on the test piece first. Cut both faces with the same setup. Try the test piece in the mortise—if it's too tight or loose, change your fence setting just a hair in the proper direction for a nice snug fit. Then cut the tenons in the rails. Put the frame together and see that it fits the opening. Measure the panel opening to the bottom of the grooves; then set the frame aside for the moment.

Now cut and glue up the wood you chose for the door panel (E). Its length and width in the Cutting List is slightly larger than the measurements you took from the door frame.

Number the joints in the door frame and mark the outer face of each part. Rip the rails to 1/32" over 5/8" thick—take the cut off the outside face. Lightly joint this face and slightly round the inside edges of the outer faces of both the rails and stiles. Put the frame back together and again fit it to the opening.

Cut the panel to size. Make it 1/16" shorter and 3/32" to 1/8" narrower than the opening. Make sure it slides easily within the grooves. Assemble the entire door dry—the joints should go home tightly and the assembly be square. Again, fit it to the opening. When you are satisfied that all is well, glue it together. Remember, when gluing an open mortise and tenon joint, put the tenon in the mortise from the top down and always put the glue in the mortise, never on the tenon. Use glue sparingly, and put it in the first third of the opening so the tenon wipes it down over the rest of the joint. This way you won't have a lot of excess glue to clean up. If some glue does squeeze out of the joint, don't wipe it off—wait until it dries and clean it up with a sharp chisel. Do not put any glue between the panel and the frame. The panel must float free in the frame or you'll run into trouble with expansion and contraction. Finally, be sure everything is tight and square. If it takes clamps to hold it that way, use them.

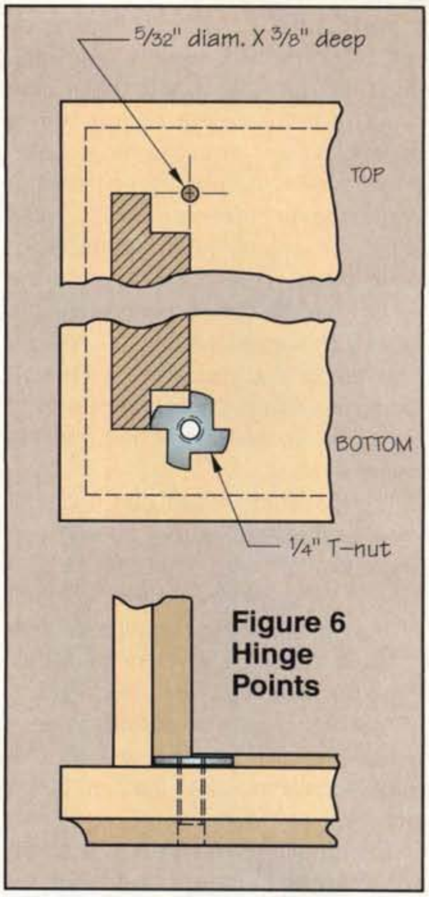


Figure 6 Hinge Points

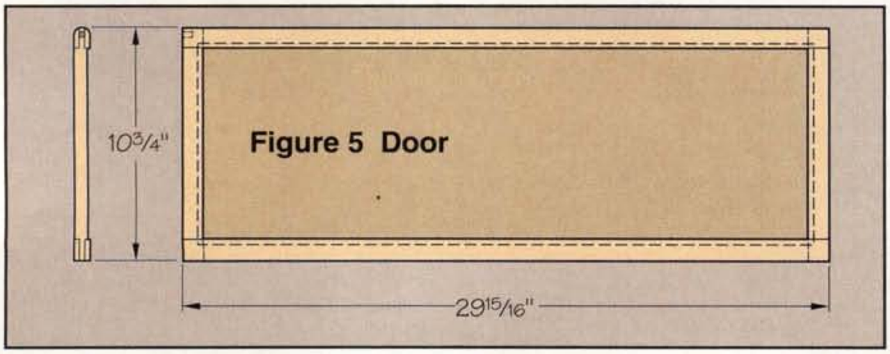


Figure 5 Door

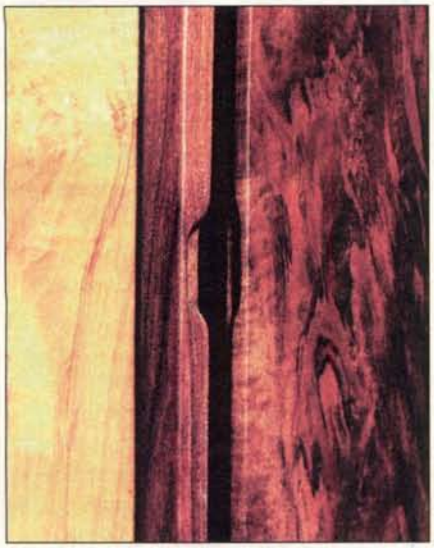
The holes for the hinge parts must be absolutely parallel to the vertical surfaces of the stile. The diameter of the hole in the bottom edge should be such that the short length of copper tubing fits with a hand push or a gentle hammer tap. The diameter of the top hole is shown in Figure 6.

Match the location of the holes exactly or the door won't sit or swing properly. The best way to make sure of this is to locate the centers with a marking gauge. With the hinge holes drilled, round off the back edge with a ⅛" roundover router bit. Finally, push or tap the copper tube and the steel pin in place. Thread the bolt into the T–nut from the bottom; then install the door by sliding the pin into its hole at a slight angle (that's why the hole is a bit oversized). When the bottom is moved into position, screw the bolt into the copper tubing.

Try the door to see that it opens and closes smoothly. If it doesn't trim it where necessary. The door can be removed by unscrewing the bolt until the bottom slides out. Install a ¼" bullet catch under the door in the center of the frame ½" from the outer edge.

The door opens by a hidden finger recess—remove the door and cut half in the edge and half in the side of the cabinet as shown below.

The best tool for this is a small woodcarver's gouge followed by 50–grit sandpaper for final shaping, and finer sandpaper for finishing.



Smooth the finger recess for a more classic look.

The Back

The back of the cabinet is a complete framed panel (Figure 7). The cabinet hangs from the back panel and you'll want sturdy construction in that area.

Make the back in the same manner as the door. Since the frame thickness is ½", the groove for the panel is ⅛" wide and ¼" deep. The tenons are ⅛" thick. Figure the overall frame size from the cabinet and not from the Cutting List.

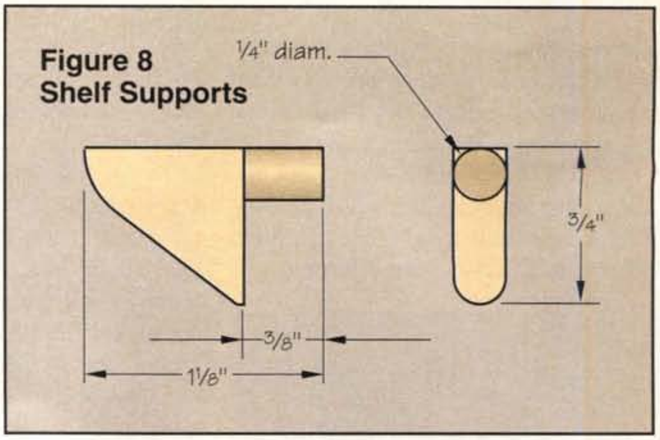


Figure 8
Shelf Supports

The panel can be glued up from the same wood used in the case since it won't show until someone opens the cabinet. Glue up the panel and size it as you did the door panel.

Rabbet the edges for a sliding fit in the ⅛" wide groove. The rabbeted face is inside the cabinet. Fasten the assembly in place with #6 X 1" FH brass wood screws. Use two on the top and bottom, and four on each side. If this seems excessive, remember the entire cabinet hangs from the panel assembly. Drill two 3/16" diameter holes in the top rail 1½" from the ends and ½" from the top edge.

If you're going to hang it with #8 X 1½" flat head wood screws in plastic expansion shields, counterbore the holes. If you're going to use moly anchors, skip the counterbore.

The Shelves and Shelf Supports

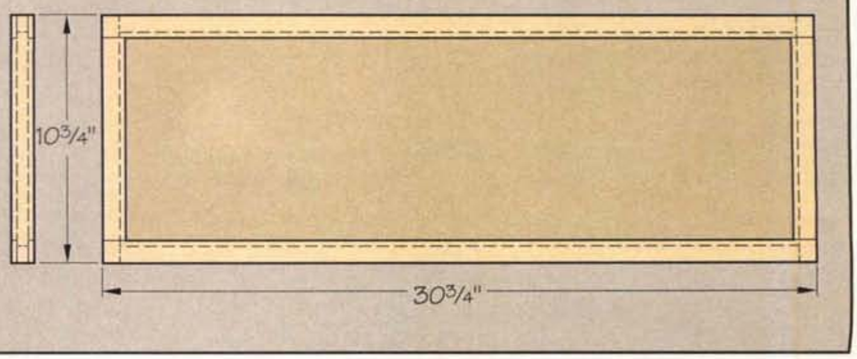
The number of shelves (I) you make depends on what you plan to store. Make them from the same wood as the case, 1/16" shorter and narrower than the free dimensions inside the cabinet. As for shelf supports, you can use metal ones the hardware store. I think they detract from the look of the natural wood, so I made my own. Refer to Figure 8 and cut them out from a piece of contrasting wood so they'll stand out, or from the same wood so they will blend in.

Cut them to shape on a band or jigsaw. Round the pin and slanting edge with a knife; then fit the pin to the holes in the case side. The fit should be snug but not tight. Finish–sand everything but the pin.

Now the cabinet's ready for finishing. Several coats of Formby's Tung Oil Finish does a very fine job. If the finish sheen you want takes too many coats, you can take this shortcut. After the first couple of coats, apply a coat or two of paste wax. Be sure it's paste and not liquid or spray—they contain water and will ruin the finish. A friend of mine who specializes in refinishing high quality antiques told me to use Trewax. I found that it does an excellent job.

If you've taken my suggestions in choosing the wood for this cabinet you'll have a lovely piece of art. Hang it in a prominent place and accept the accolades of friends and guests who see it. PW

Figure 7 Back Panel



A Popular Woodworking Project

Making Pine Burl Tables

A dado cut round the slab on the radial arm saw will guide the chainsaw in removing the waste and evening the bottoms efficiently.

by H.B. Roholt and Hugh Foster

The flames, flares, swirls and figures resulting from incomplete end grain budding are so unique and beautiful that these patterns almost cry out to be used, displayed and cherished. Burls surely are "one of nature's amazing mysteries—the starry galaxy within is greater than the form containing it." (from Mark Lindquist's "Harvesting Burls," *Fine Woodworking,* August 1984)

In August 1987, I acquired a burl three–and–a–half feet wide by four feet long which had formed on the trunk of a large storm-felled Norway pine. I had the burl and tree trunk section sliced into nine 4" thick slabs by a sawyer skilled in the use of a 20" chain saw. This article describes the methods used to construct tables from three of the nine burl slabs.

I first removed the bark, underlying detritus and insects from the slab edges, and from areas where bark inclusions occurred on the slab surfaces. This was tedious work—chipping, pounding, prying and picking.

To avoid splitting and cracking, I air–dried the slabs slowly until their moisture content equalled indoor conditions. To slow the drying, I sealed the flat surfaces—some with urethane varnish, some with paraffin wax—but not the edges. Orthorix® spray applied to all edges stopped mold growth while the slabs were drying in my unheated but well–ventilated garage attic. I weighed the slabs periodically, and by September 1988, weights were stable with losses in the range of 25% and with meter–measured moisture contents of 14% to 16%.

I then moved the three slabs select-

***Dr. H.B. Roholt** of Bemidji, Minnesota is a woodworker, fisherman and photographer. **Hugh Foster** writes regularly for* PW.

ed for tables to an unused bedroom, wifely objections notwithstanding. Three months later, January 1989, weights were again stable with total weight losses in the range of 28% to 35%, and meter–measured moisture contents of 8% to 9%.

Here's a chart of the drying times—it shows that you don't need to use a moisture meter for exact measurements until you've reached dry weight stability under indoor conditions.

burl 1	burl 2	burl 3	
44 1/4	67 3/4	68 3/4	Sep 1987
38 1/2	64		Nov 1987
31 3/4	60 1/4		Jan 1988
32 1/8	51 1/2		Feb 1988
32 1/4	51 1/4		Mar 1988
29 1/4	48 1/2	44 1/4	Jan 1989

I began shaping the three table tops in the fall of 1989. I leveled the top surfaces with a hand power planer and sanders. To get uniform thickness, I first cut a 1/4" wide by 1/2" deep marking dado around the slab with a dado head horizontally positioned in a radial arm saw. Then I placed the previously leveled top surface of the slab downward on the radial saw table and slowly rotated the slab edge into the running dado head. A chain saw removed the excess, with the dado serving as a guide for the chain saw cut. The new underside of each slab, now parallel with the top, was then power–planed and rough–sanded.

The slab edges were shaped on the band saw, and then flap–sanded. I used only burl with appropriate edge trimming for one table; two others consist of burl and the attached section of tree trunk.

Unsightly surface and edge cracks and voids turned into interesting details when filled with a tinted two–part polymer (from Envirotex and Chemco Transparent Resin dyes, Environmental Technology, Inc., P.O. Box 365, Fields Landing, CA 95537). To prevent the liquid polymer from bleeding into wood fibers adjacent to filled areas, I applied two coats of Waterlox Transparent (from Waterlox Chemical and Coatings Corporation, 9808 Meech Avenue, Cleveland, OH 44105) to areas receiving the polymer. Then an epoxy putty applied to the edge and underside surface areas of stress cracks pre-

Sanding can be hard on your hearing, so get in the habit of wearing ear protection.

vented the poured mixture from leaking out while setting. The Envirotex brand of reactive polymer shrinks very little and tends to trap very few bubbles, but it takes three days to cure to full strength. I had to refill some stress cracks and voids to get the polymer surfaces level with the top. Progressively finer sanding of edges and top surfaces followed. Firm rubbing with acetone–soaked cotton swabs removed the fine sanding scratches from the Envirotex.

I elected not to use the two–part polymer as the finish for the table tops, as is often done. I feel that this type of finish creates a tactile barrier between you and the wood. Polyurethane varnish can't be used, as it will adversely react with the polymer fill. I chose a tung oil–based varnish for finishing. Tung oil has far less tendency to darken with age, and has far more water and alcohol resistance than a linseed oil–based finish. I applied Waterlox Transparent's brand of tung oil varnish four times with fine sanding between coats and a final 400–grit sanding.

In April 1990, I made the pedestal bases. Elm segments previously soaked in PEG (polyethylene glycol—often used by turners and available from mail order woodworking suppliers) were dried and turned by me, and by a professional turner, Jim Gabraelson of Grand Rapids, on his heavier lathe. PEG displaces the water in green wood to prevent cracking and checking as the wood dries. It stabilizes green wood enough to permit its use right after processing. However, the PEG processing makes it difficult to match the treated wood's finish to the untreated wood's.

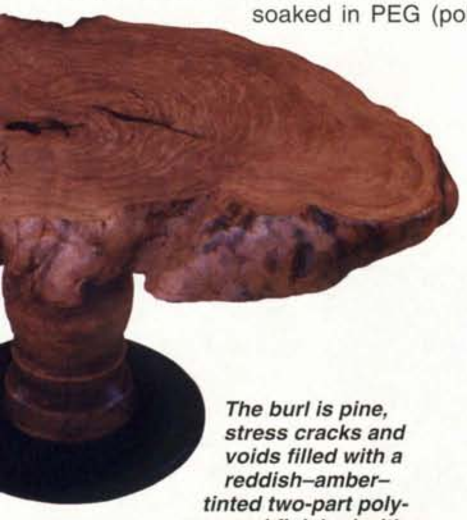
After sanding the pedestals, I stained several with Minwax Dark Walnut. Honeytone Amber Maple aniline dye was applied to the remaining pedestals. (Lockwood 145, 15 grams per quart of distilled water. My source was Woodcraft Supply, 210 Wood County Industrial Park, Box 166, Parkersburg, WV 26102–1686) Then I applied three coats of Waterlox Transparent, with sanding between coats, to all pedestals.

On the band saw I cut circular bases for the pedestals from edge–jointed, air–dried native elm, with the edges then rounded by router. Three threaded brass inserts #20 X ¼" are set in under each base for leveling. I finished the circular pedestal bottoms with an oil–based primer and two coats of an oil–based satin black enamel because I was unable to match the finishes on the PEG–treated pedestals.

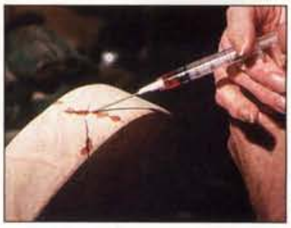
The bases are attached to the pedestal bottoms with #10 X 1½" recessed flat head screws. Medium density fiberboard (MDF) circles were screwed to the pedestal tops and then screwed to the underside of the table tops with #10 X1¾" screws. All table parts are thus separable for ease in packing and shipping.

With the tables so finished, the grain structure is not only visible, but feels as near to wood as possible. Maintenance is easy; surfaces need only dusting. Waxing won't hurt, but it's not needed. The Waterlox finish is resistant to alcohol, stains and water, and scratches can be rubbed out and touched up. Pine is a softwood, so it's best to avoid dropping hard objects on the table surfaces—especially on the "tree" parts of the table where the surface is almost entirely end grain.

Where are the remaining pine burl slabs and the elm and ash burls? All are chainsawn roughly into slabs. Most rest in my garage attic, but I smuggled a few up to the empty bedroom to dry while awaiting the woodworking pleasures of the coming winter. PW

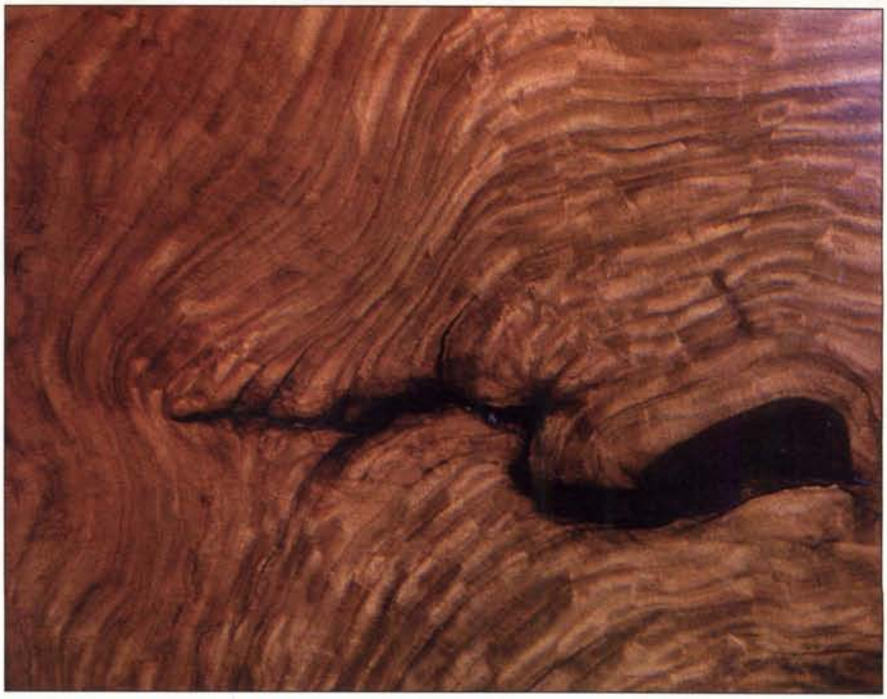


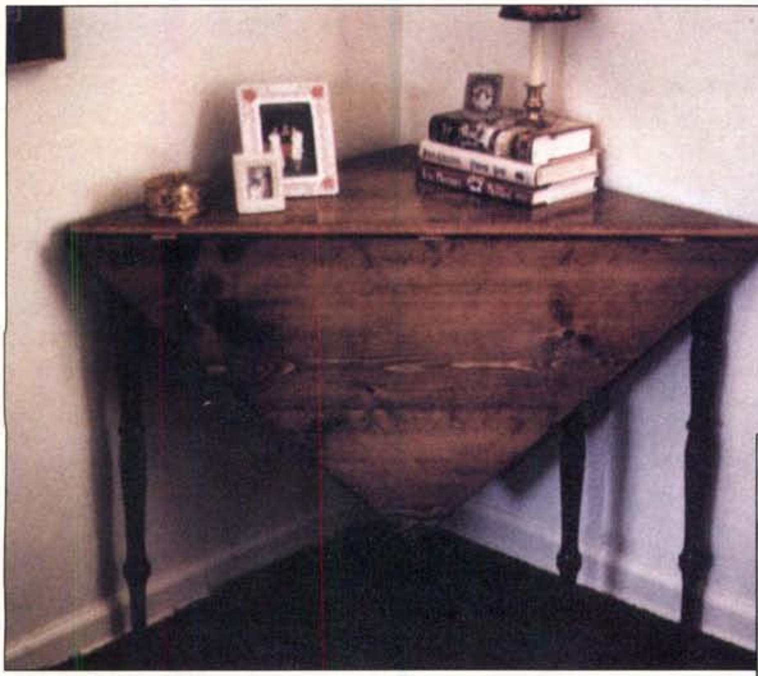
The burl is pine, stress cracks and voids filled with a reddish–amber–tinted two-part polymer, and finished with a transparent, tung oil–based sealer.

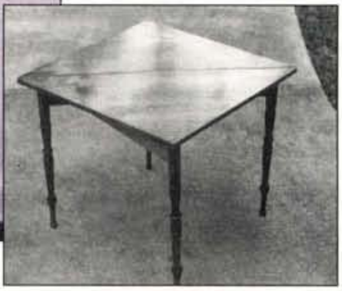


Repair splitting edges by injecting epoxy well into the cracks.

Pedestals are PEG–treated elm stained with Minwax dark walnut or elm coated with satin black enamel.







Colonial Handkerchief Table

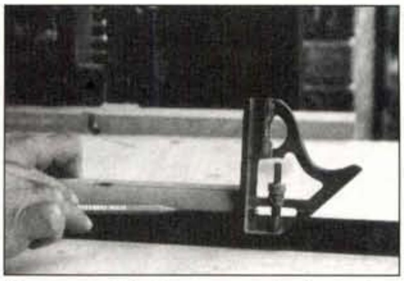
by Robert L. Elmore

The handkerchief table was commonly found in many early colonial homes. Designed to fit into the corner of a room, it frequently held a candle stand covered with a hurricane glass or an oil lamp. The table featured in this project is modeled after one found in the Colonial Museum located in Midway, Georgia. The tops on the original were made from single, wide planks, but by carefully matching the wood grain you can glue up narrower boards and achieve the appearance of single plank tops.

The construction is straight forward and you will be pleasantly surprised at how quickly it goes together. These tables were made from a variety of woods. I made my table from white pine like the original. Choose a wood to suit your preference. The original table featured simple turned legs. Acceptable substitutes can be found in many home improvement or lumber supply centers as 1⅝" diameter by 28" long colonial style turned legs. I used drop leaf hinges in place of the strap hinges found on the original. The use of drop leaf hinges closes the rule joint for the proper leaf alignment and is highly recommended.

Choose the best quality boards for the tops. Cut the top pieces A and B to the dimensions given in the Cut List. Measure the length of each board and mark the center point. Dress the mated edges to obtain a perfect fit. Glue up two top panels, matching the center marks of parts A and B. Clamp each panel together using only enough pressure to close the joint. Set the two glue–ups aside to dry.

Turn the leg blanks (parts C, D and E) to the profile shown in the PullOut™ Plans or use commercially turned colonial legs of the proper size. Use a combination square to mark the flats. This will insure perfectly straight lines down the length of the turned upper portion. Set your square at 5" and measure off the length of the flat down the turned upper portion. Use a fine toothed backsaw or a coping saw to cut the bottom line of the flat ⅛" deep between the layout lines. Do not cut beyond the layout lines.

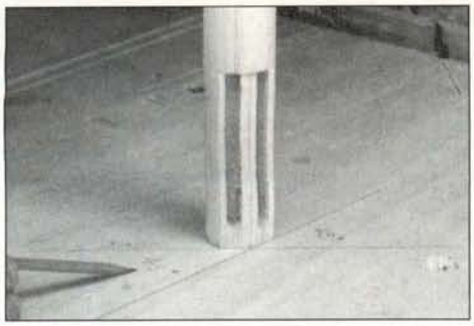


Use a combination square to lay out the flats and mortises.

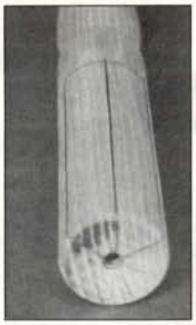
Clamp the leg in a vise and cut the first flat ⅛" deep. I prefer to use a razor sharp ½" wide chisel to cut the flats on the turned legs. This operation goes quickly and gives better control of the cut than many other methods and allows you to gradually sneak up to the lines without overcutting. After cutting the first flat, use your combination square to mark out the second flat at 45 degrees from the first flat on the two front legs and at 90 degrees on the corner leg. Check the progress of the cutting frequently with your combination square to prevent the cut from straying. Take your time and

---

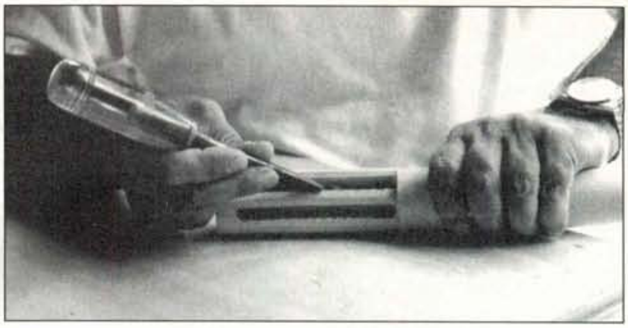
***Robert L. Elmore** is a dedicated woodworker and freelance writer from Richmond Hill, Georgia.*



The front legs are cut with opposing 45° flats.



The lathe spur marks show accurate 45° and 90°.



Use a sharp chisel to clean the edges of the mortises after drilling.

make shallow cuts with the chisel. Use the same procedure for cutting the flats on the other legs as shown in Figure 2.

Make the drilling jig shown below. This jig holds the legs steady when drilling out the mortise slots in the legs. Clamp the leg in the drilling jig with the top bar and two long screws.

Layout the mortises on the legs. Starting at the outside edge of the flat on one leg, use the blade of your combination square to mark off a line 3/16" from the outside edge of the flat. From this line, mark another line 3/8" back from the first line. Mark lines 1/2" from the top and bottom of the flat. You should now see the outlines of the mortise slot measuring 3/8" by 4" and positioned 3/16" from the front of the flat and 1/2" from the top and bottom of the flat. Go to the other flat and layout the next mortise slot starting again at the outside edge of the flat. Follow this procedure to lay out all mortise slots on all legs.

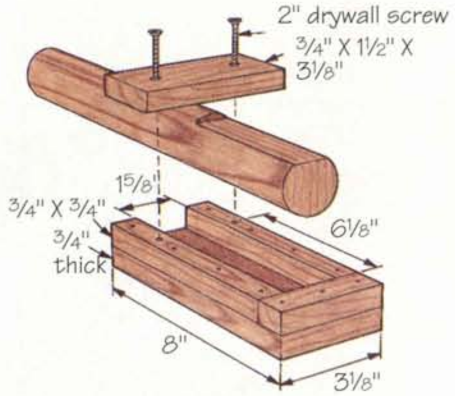


Figure 1. Leg Drilling Jig

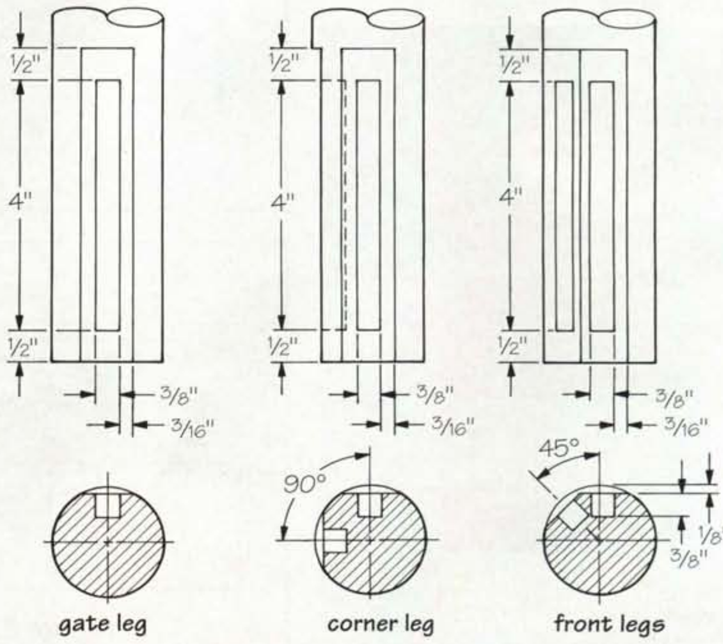
Clamp one of the legs in the drilling jig and make certain that the flat you intend to drill is perfectly horizontal. Check this with a level. Set up the drill press with a 3/8" diameter Forstner bit or bradpoint drill and adjust the drill press for a 3/8" depth of cut. Drill a series of overlapping holes the entire length of the mortise slot. Rotate the leg to the next flat and drill the next mortise slot. Repeat this procedure for all four legs. Clean up the sides of the mortise slots with a sharp chisel. Do not cut away the outline of the mortise slot. You will want a tight fit when the tenons are inserted.

Cut the apron pieces (F, G, H, I, J and K) to size as given in the Cut List. Lay out the tenons on both ends of the side aprons (F) as shown in Figure 3. Cut the tenons. Do not sand the tenons; the roughness of the cuts will contribute to a tight fit and strong glue joint. Layout and cut the tenons on pieces G, H, and I.

Lay the left apron (G) and the gateleg apron (I) end to end on your workbench surface. Place the tenon on the left apron to your left and the tenon on the gate leg apron to your right. Layout the hinge on the gateleg apron as shown in Figure 4 (next page). Make certain that the layout lines are square and straight. This piece will be used as a template for the matching portion on the left apron. After cutting the hinge portion on the gate leg apron, round over the back corner of the piece as shown in Figure 4 to a 3/8" radius. This will permit the part to swing when placed against the surface of the front apron brace and joined with its mating piece, the left apron.

Mark the center of the hinge pin location exactly in the center of the top edge of the gate leg apron. Clamp a short section of 2 X 4 stock, or some type of auxiliary fence to the drill press table to ensure that the piece remains perfectly

Figure 2. Leg Flats and Mortises



vertical during the drilling of the hinge pin hole. Drill the two ¼" diameter hinge pin holes.

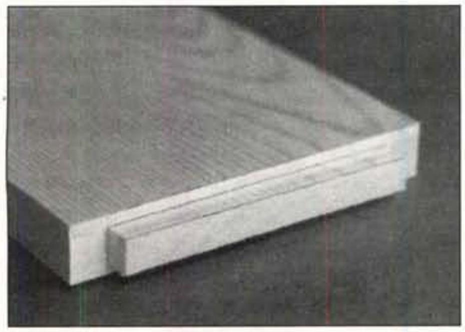
From the righthand side of the left apron, measure ¾" to the left and layout the 45 degree angled backcuts. Use your backsaw to make these cuts on both ends of the left apron. Align the hinge portion of the gate leg apron with the ¾" setback line on the left apron. Mark and cut the matching section of the hinge on the left apron. Trial fit the two pieces and round the front edge of the hinge portion to permit an unobstructed swing. Check the fit of the left apron and gate leg apron in the mortise slots of their mating legs.

Finish sand the parts and assemble the hinge section. Shim the parts approximately 1⁄16" apart, insert a ¼" diameter bradpoint drill bit from both sides of the gate leg apron, and gently tap the drill with a mallet. The drill point will mark the location for the ⅛" diameter hinge pin holes to be bored in the left apron. Place the left apron against the fence of the drill press table and drill the ⅛" diameter hole through the tab of the left apron.

Miter the ends of pieces J and K, and cut the dado as shown in Figure 5 below. Glue and nail the front apron assembly together. When the glue is dry, sand the assembly with 150–grit sandpaper.

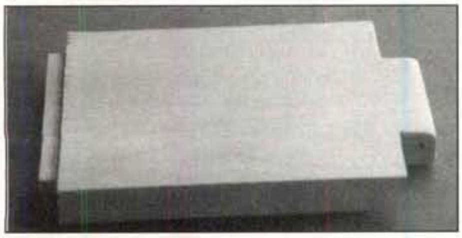
Make one corner brace (L) and two corner braces (M) as shown in Figure 7 on page 42. Apply glue and fit one tenon of each side apron into the mortise slots of the corner leg. Glue and fit the front legs onto the opposite end of the side aprons. Glue and fit the front apron assembly between the front legs. Check the aprons for proper alignment with the top of the legs. Use a strap clamp or three pipe clamps to draw the whole base tightly together. Check with a framing square for proper alignment and install the corner braces with glue and screws.

Make the top clamps (N) as shown in Figure 8, and install them at the upper edges of the side aprons. The direction of

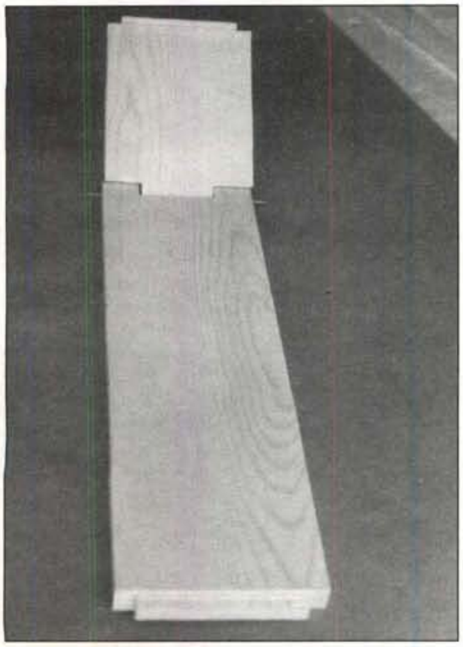


Don't sand the cut tenons. The rough edges make for tighter joints.

Round over the front edge of the left apron to allow free movement of the gate leg hinge.



Assemble the gate lege hinge and check for smooth opperation.



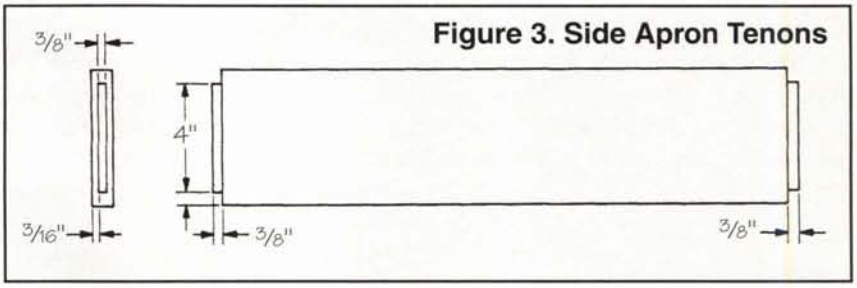


Figure 3. Side Apron Tenons

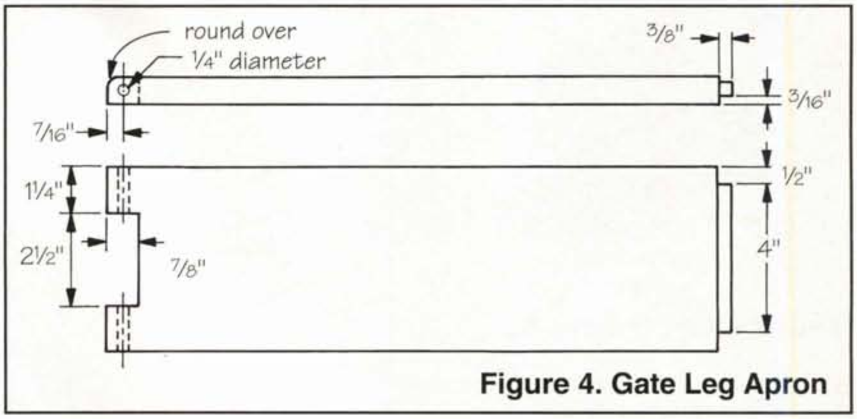


Figure 4. Gate Leg Apron

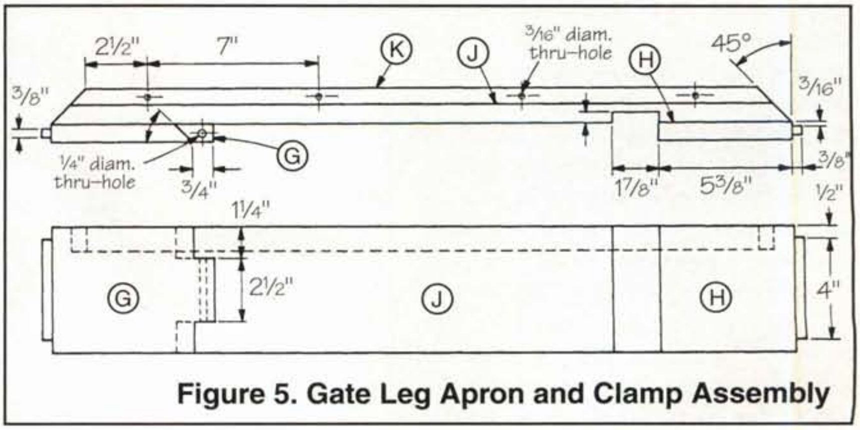


Figure 5. Gate Leg Apron and Clamp Assembly

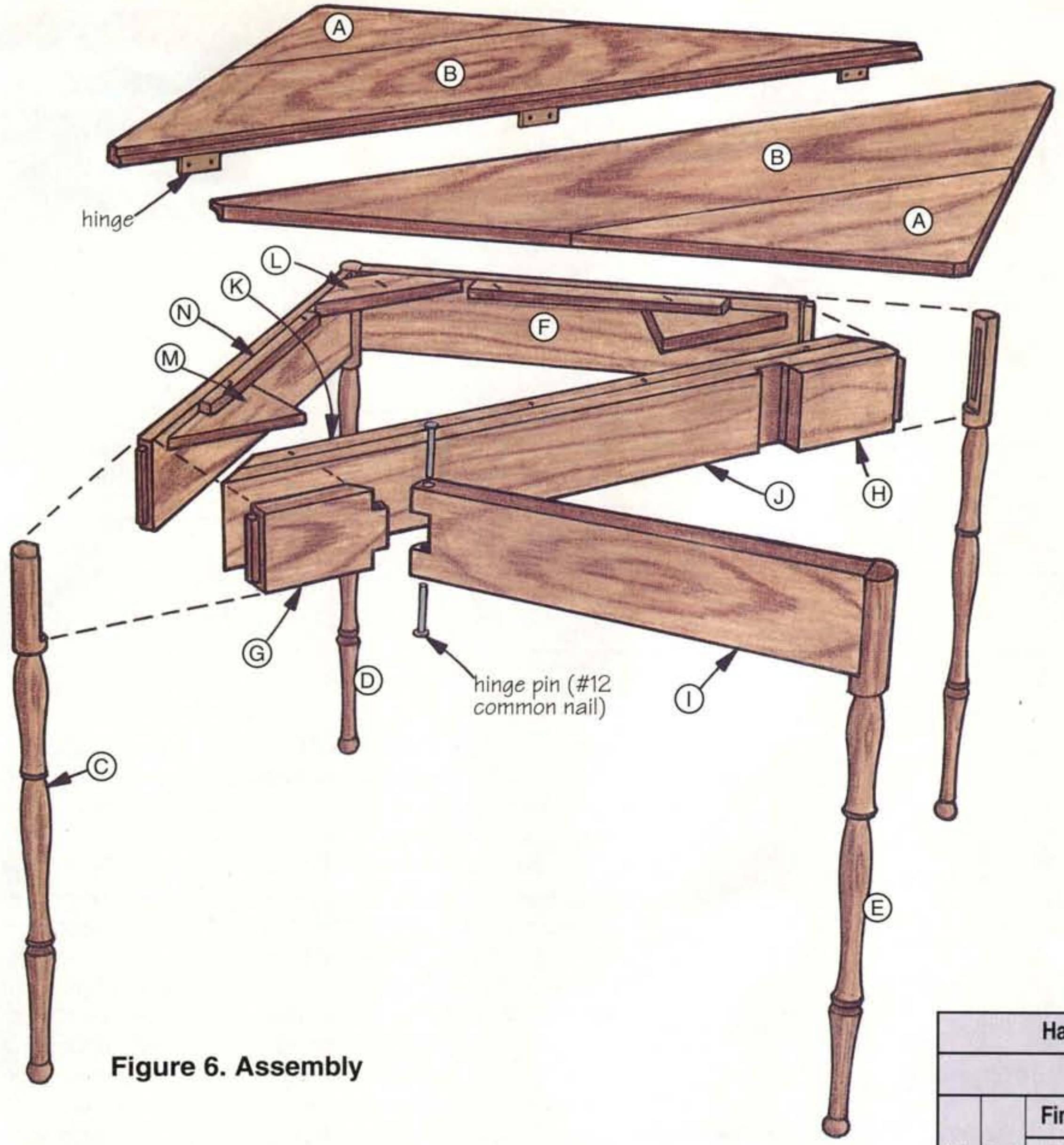


Figure 6. Assembly

expansion is from the front apron assembly toward the corner leg. The top will be fastened securely to the front apron assembly and all expansion of the top is toward the rear.

After the glue is dry, sand the front surfaces of the aprons with 220–grit sandpaper. Glue the gate leg apron into the gate leg. Make certain that the gate leg apron is inserted into the gateleg with the rounded back corner in the proper position. Sand the gate leg assembly with 220–grit sandpaper after the glue has dried.

Cut two 2¼" long hinge pins from No. 12 common nails. Align the gate leg apron with the left apron and insert the pins from both sides, tapping them ¼" below the surface of the edges. Plug the openings in the gateleg apron with sections of 5⁄32" diameter hardwood dowel and sand flush.

Inspect the glued–up tops and carefully scrape away any excess glue from the joint lines on both sides. Set up the router table with a ½" radius cove cutter and rout the hinge edge of the dropleaf section of the top as shown in Figure 9. Change the router cutter to a ½" radius rounding over or quarter–round cutter and route a piece of scrapwood to mate with the dropleaf section of the top. When the cutter is properly adjusted, rout the hinge edge of the fixed top section.

Layout the triangular shape of each top section as shown in Figure 10. Clamp a short, straight length of scrap material to the table top as a guide and cut the 45 degree angles on the top sections with a portable power saw. Make certain that the guide is an equal distance from both ends of the cutting line and on the mark for the saw kerf.

Place a strip of masking tape on one of the rule joint surfaces and turn the top sections face

Handkerchief Table					
Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
2	A	¾"	11¼"	22½"	short top piece
2	B	¾"	11¼"	45¼"	long top piece
2	C	1⅝" diam		28"	front legs
1	D	1⅝" diam		28"	corner leg
1	E	1⅝" diam		28"	gate leg
2	F	¾"	5"	21½"	side aprons
1	G	¾"	5"	7"	left apron
1	H	¾"	5"	5¾"	right apron
1	I	¾"	5"	17¼"	gate leg apron
1	J	¾"	5"	30⅛"	front apron brace
1	K	¾"	1"	28⅝"	front apron clamps
1	L	¾"	2"	5½"	corner brace
2	M	¾"	2¼"	4"	front corner braces
2	N	¾"	¾"	8"	top clamps

Figure 7. Corner Braces

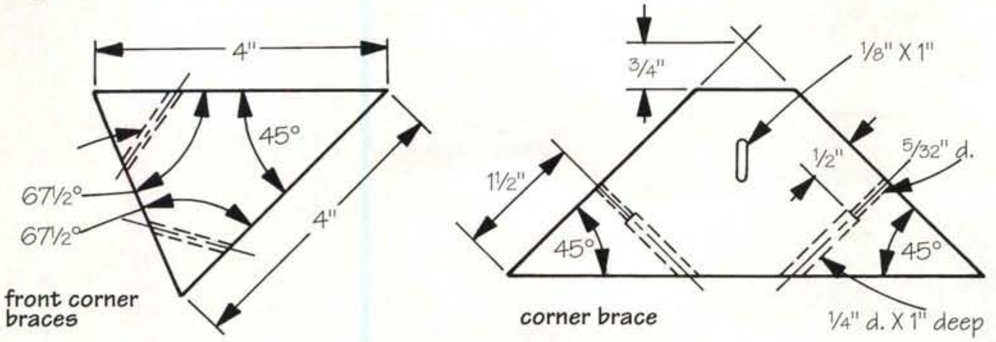
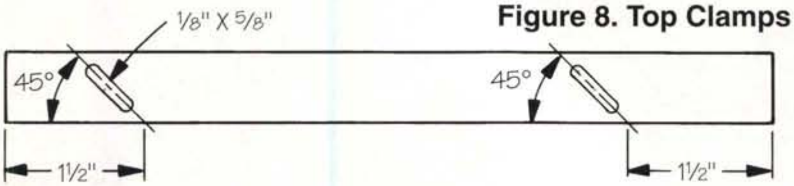


Figure 8. Top Clamps



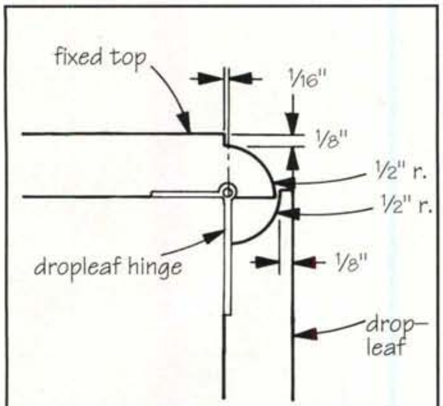
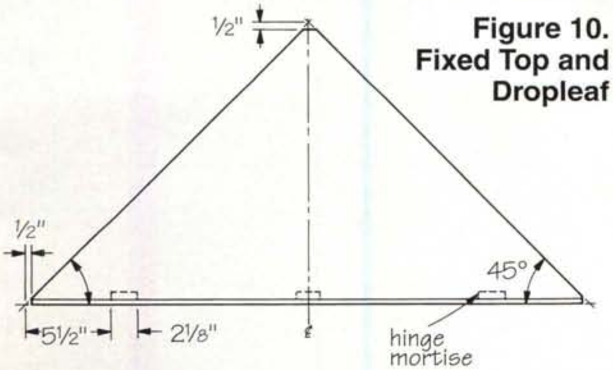


Figure 9. Top Hinge Joint

down on a clean work surface with the routed rule joints together. The tape acts as a thin spacer between the top sections. Measure back from each corner of the routed edge 5½" (½" will be trimmed during final sanding). Place one dropleaf hinge in the center of the rule joint and the other dropleaf hinges on the marks, short tab on the fixed top section, hinge pin down, and with the center of the hinge pin located 1⁄16" from the ⅛" shoulder toward the dropleaf. This locates the hinges in the proper position as shown in Figures 9 and 10. Mark the hinge outlines with a pencil. Using a sharp chisel, mortise the top sections just deep enough to allow the hinges to lie flush with the surface. Remove more to recess the hinge pin.

Figure 10. Fixed Top and Dropleaf



Temporarily screw the hinges to the top sections and fold them together. Remove the tape and check the movement of the dropleaf. Now, remove the drop leaf section (attached to the long tabs of the hinges) and set it aside.

Place the top section, the one with the hinges still attached, face down on the worktable. Now, place the assembled table base upside down on the fixed top section and align it so that all three aprons are 2" from the edges of the top. Mark this location with a pencil. Secure the top with 1¼" screws. Place the screws in the centers of the top clamp slots. Check the base to see that it is still in the proper position on the top and then drive the screws into the front apron clamp.

Trim the corners of the tops back ½" as shown in Figure 10. Sand the tops lightly with a belt sander to a perfectly flat surface. Working down to 220–grit sandpaper with an orbital sander. Wipe the top surface with a rag dampened with mineral spirits and look for any sanding marks. The mineral spirits will show them and you can hand sand them with 220–grit sandpaper. The spirits will evaporate and will not affect the final finish. The edges of the tops are sanded straight and smooth with no decorative rounding.

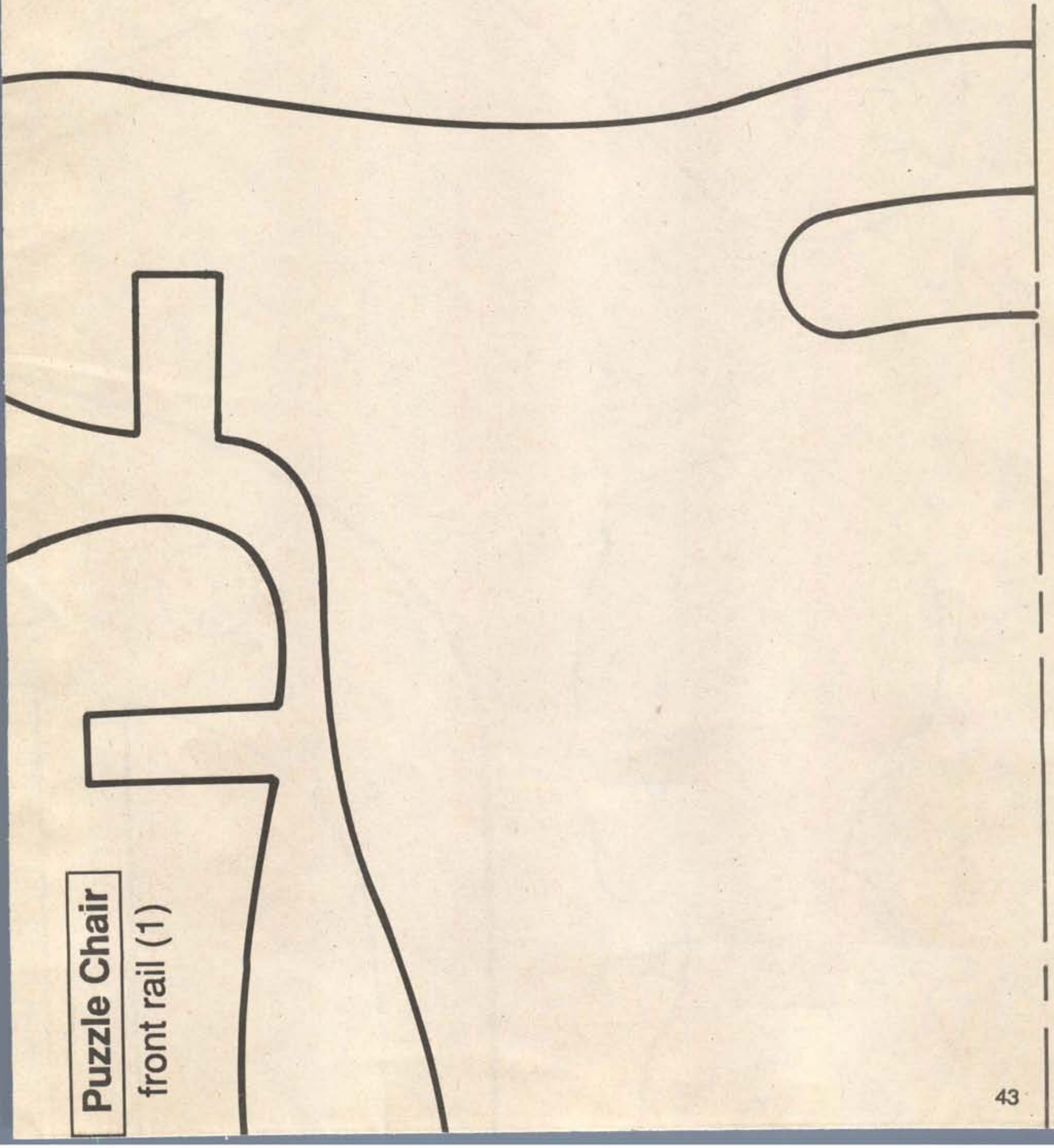
Clean away all dust with a clean tac–cloth and stain the project. I used two coats of Minwax No. 230, Early American, followed by five coats of Carver Tripp No. 7134, waterbased polyurethane, rubbed between coats with No. 0000 steel wool. This finish is available in both high gloss and satin formulas.

When the finishing is completed, turn the table upside down on a padded surface and attach the dropleaf. Set the table in that special corner and watch it get attention. The handkerchief table is truly Americana at it's best. PW

Popular Woodworking No. 73

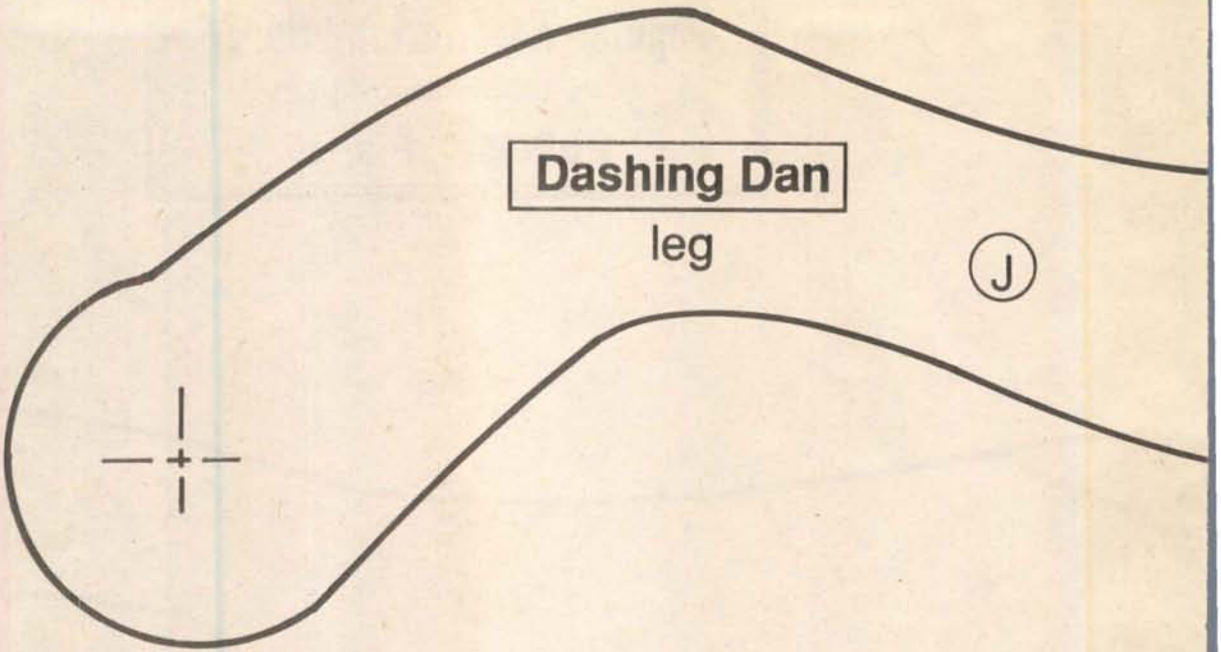
July 1993 (pages 43-58)

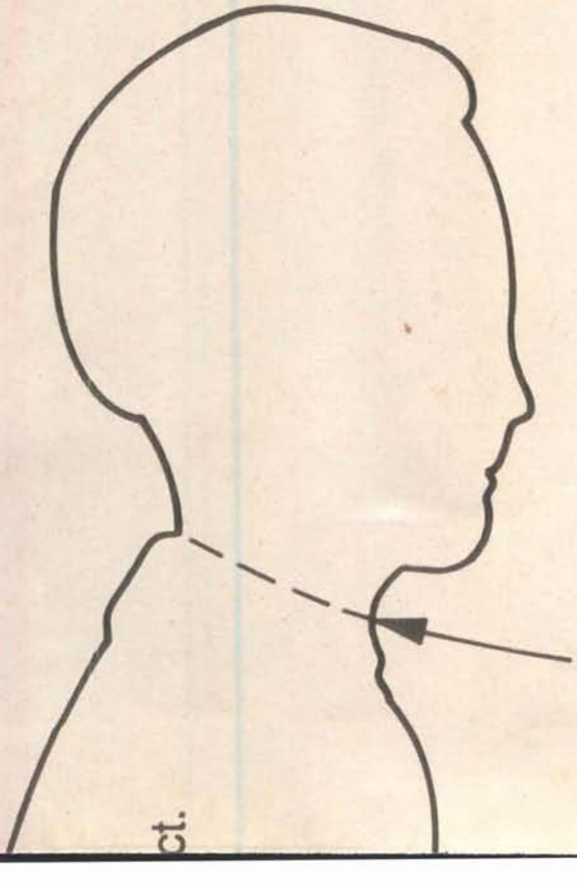
PullOut™ Plans

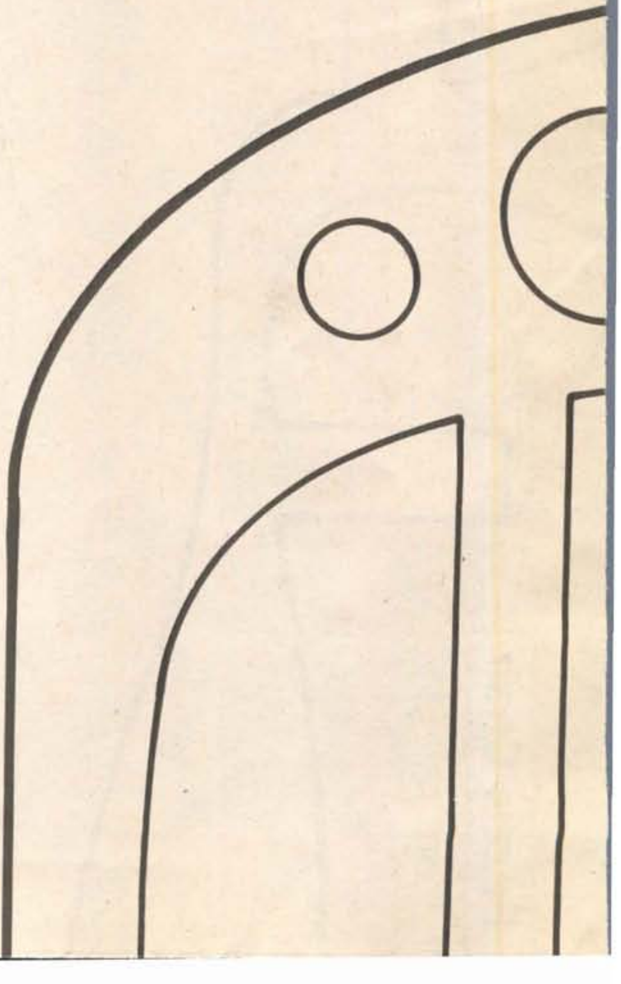


Puzzle Chair

front rail (1)



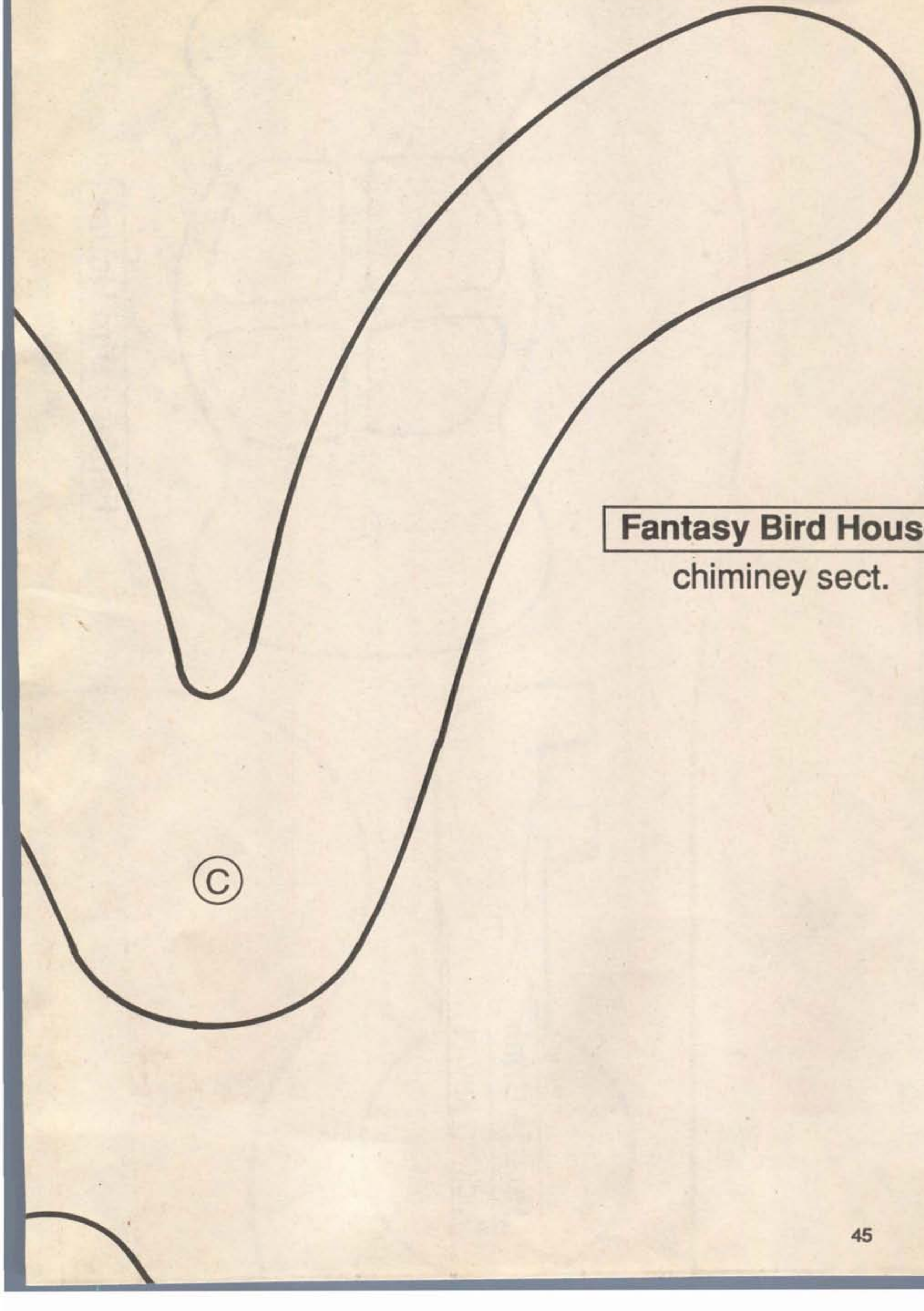


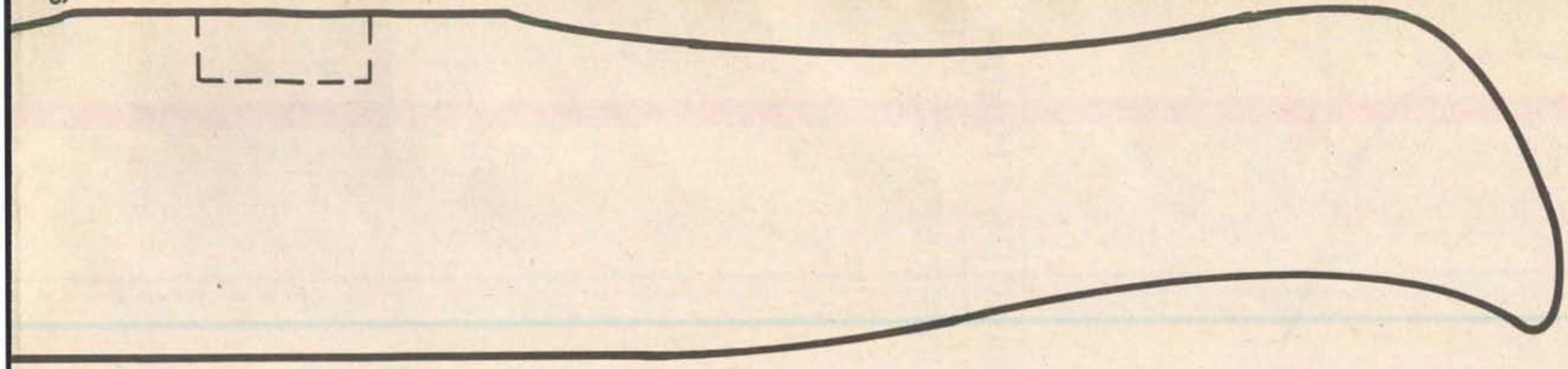


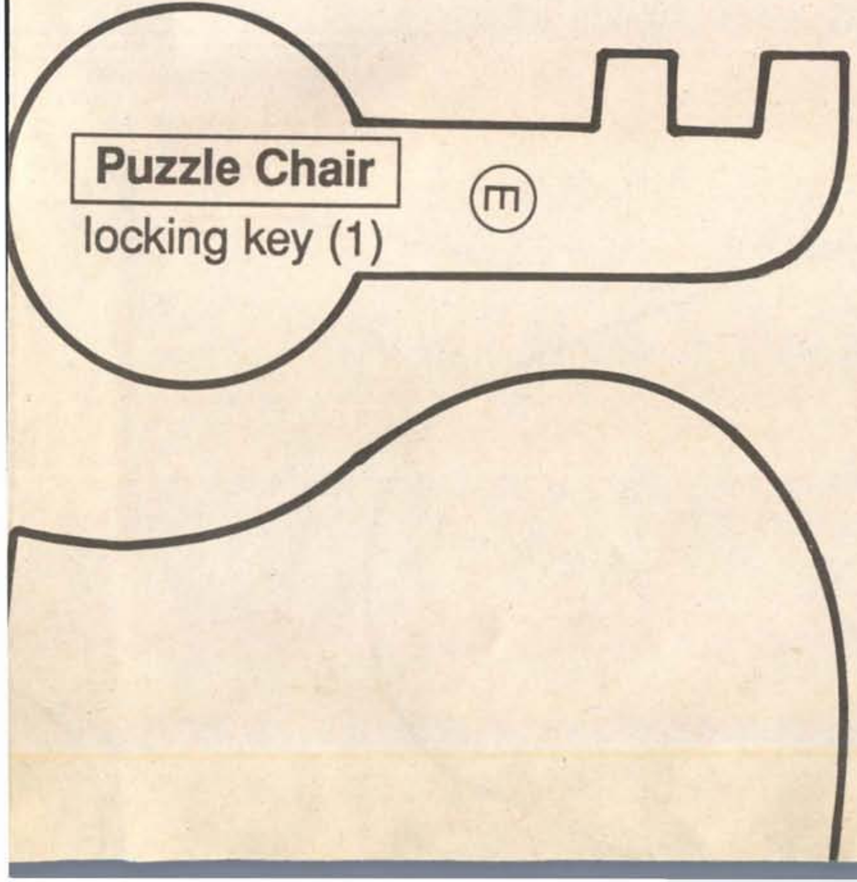
ct.

Fantasy Bird House

chiminey sect.

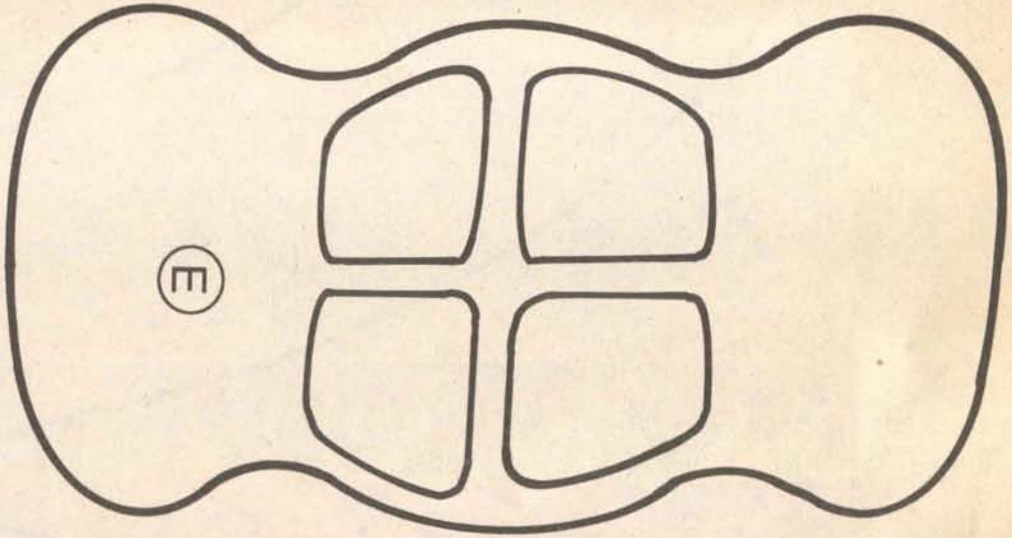






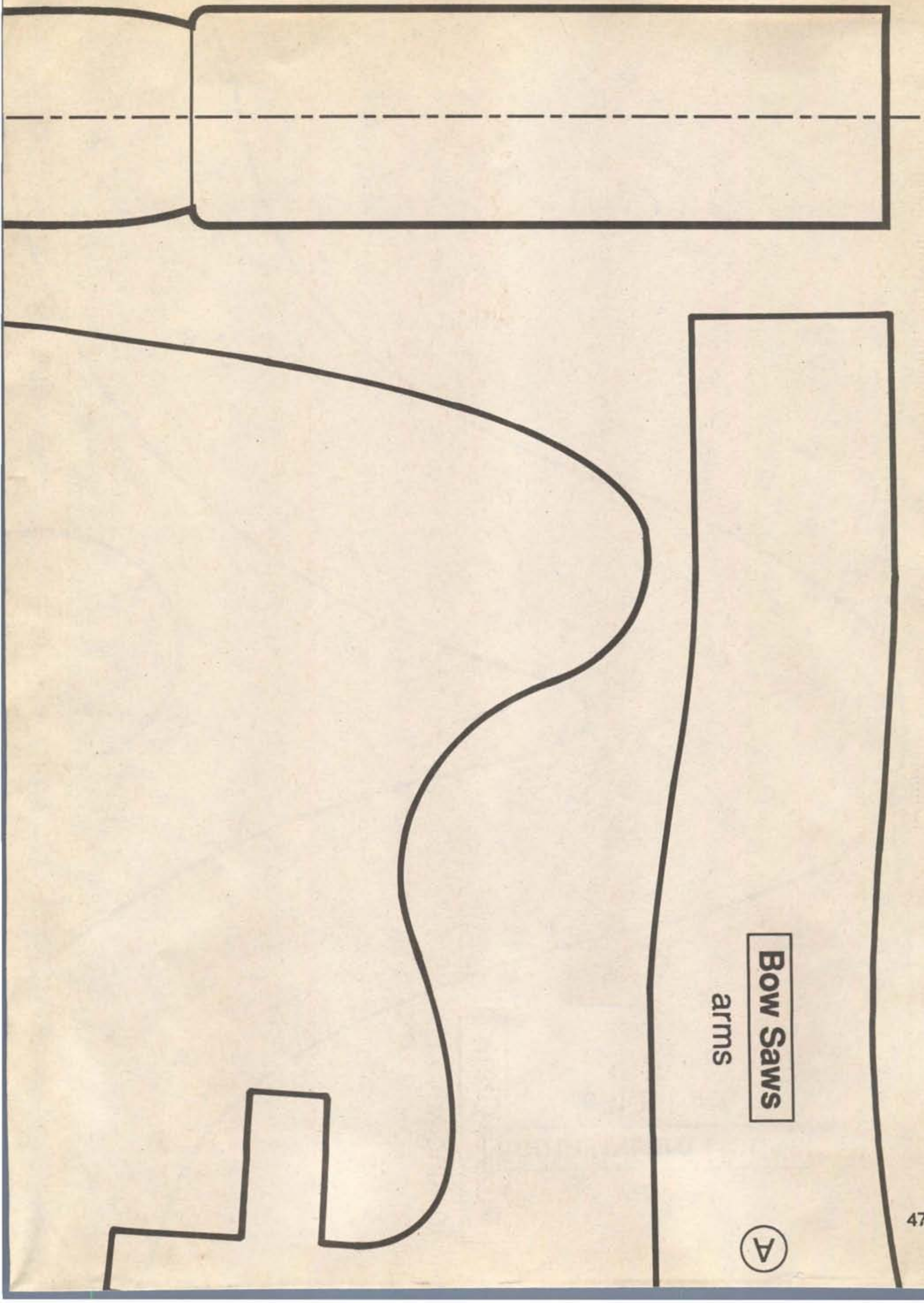
Puzzle Chair

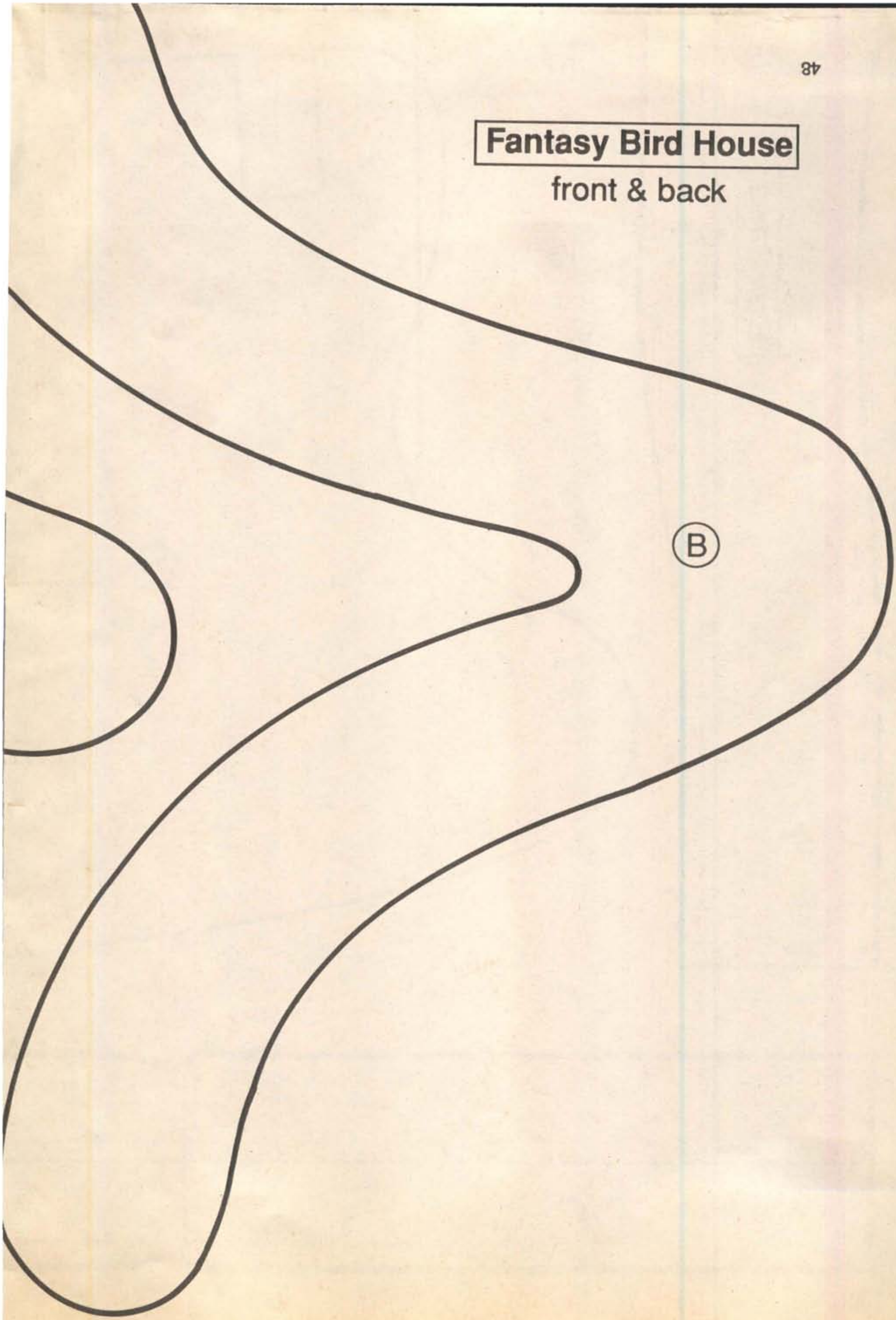
locking key (1)



Fantasy Bird House

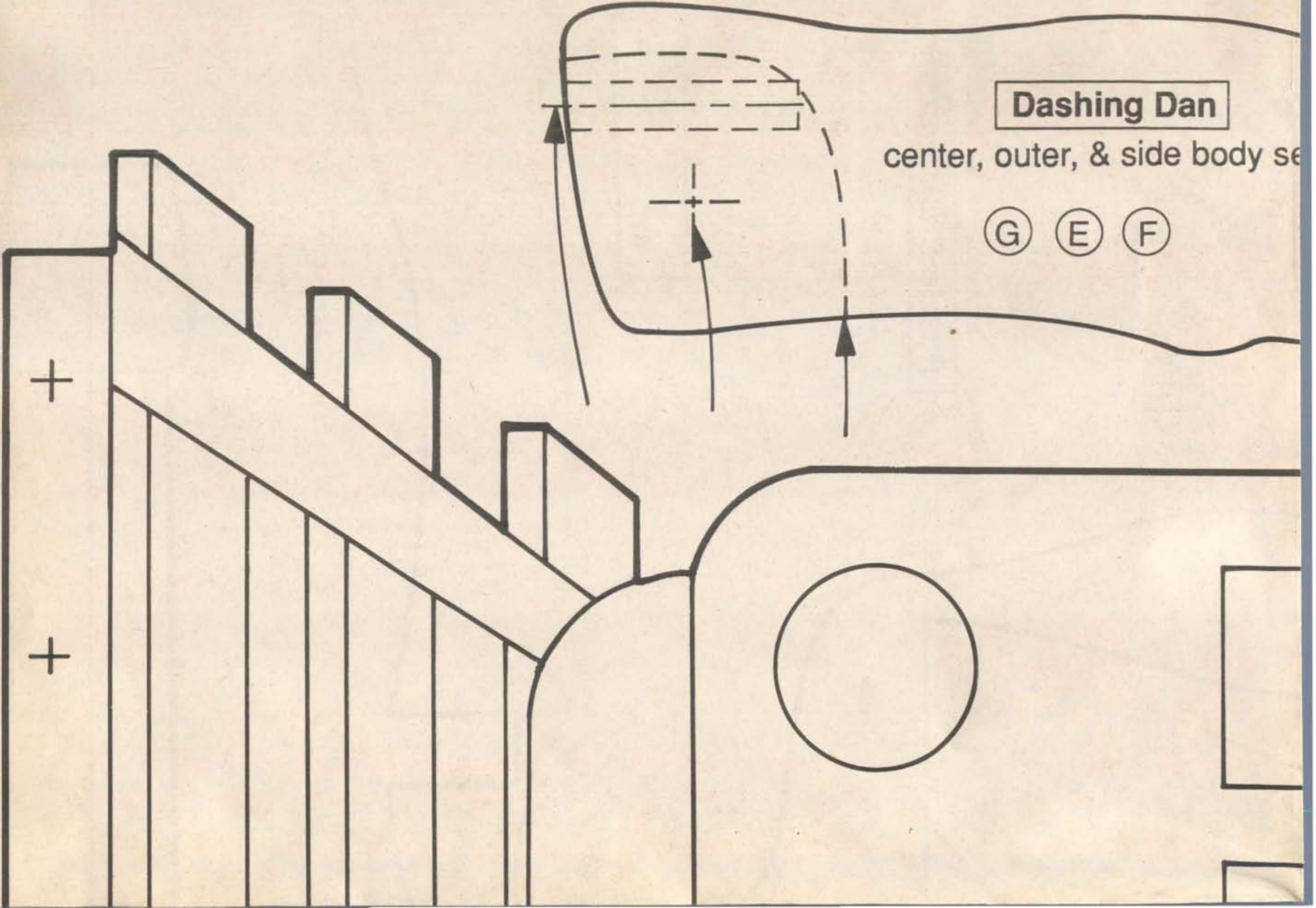
windows

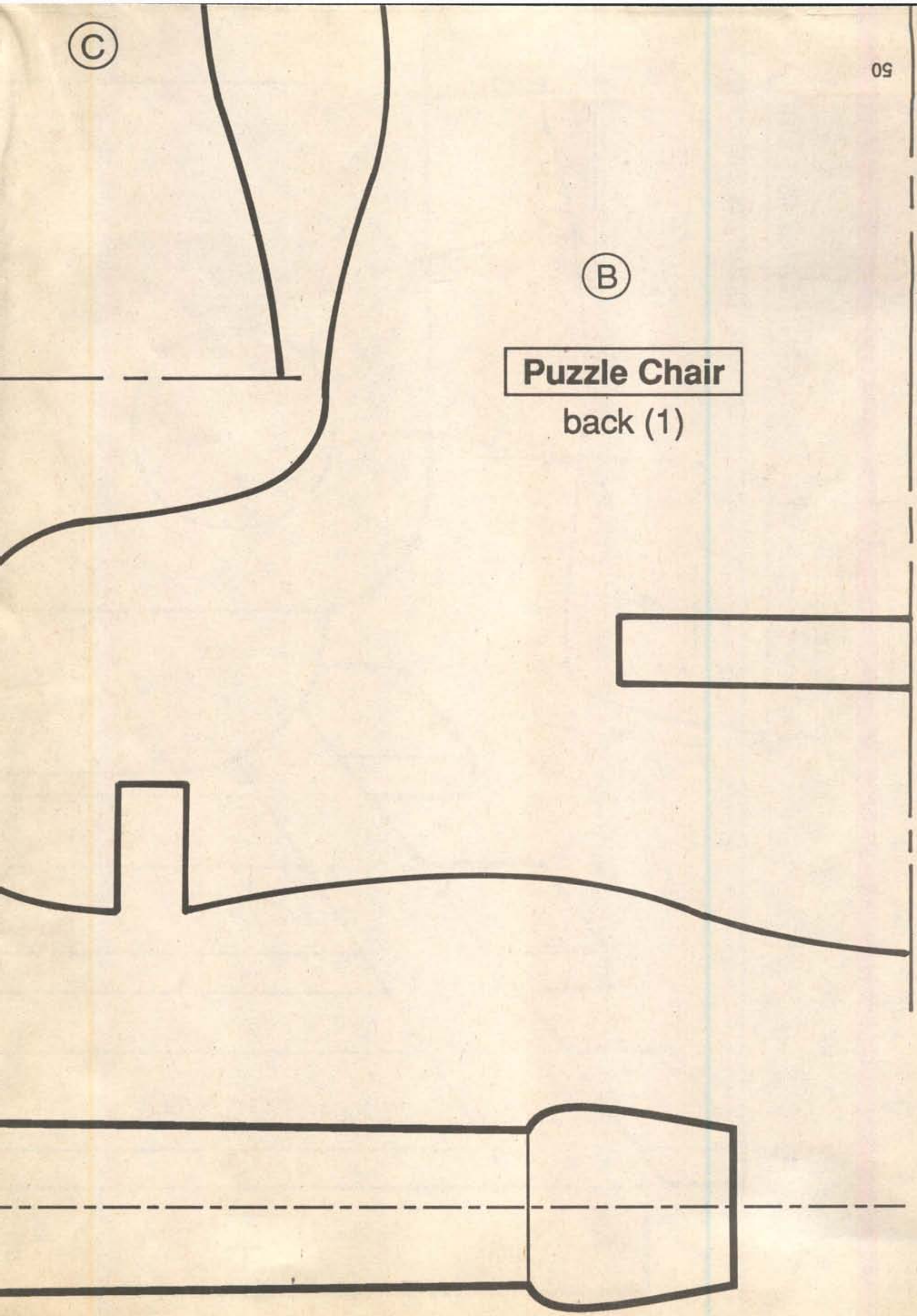

Bow Saws
arms
A

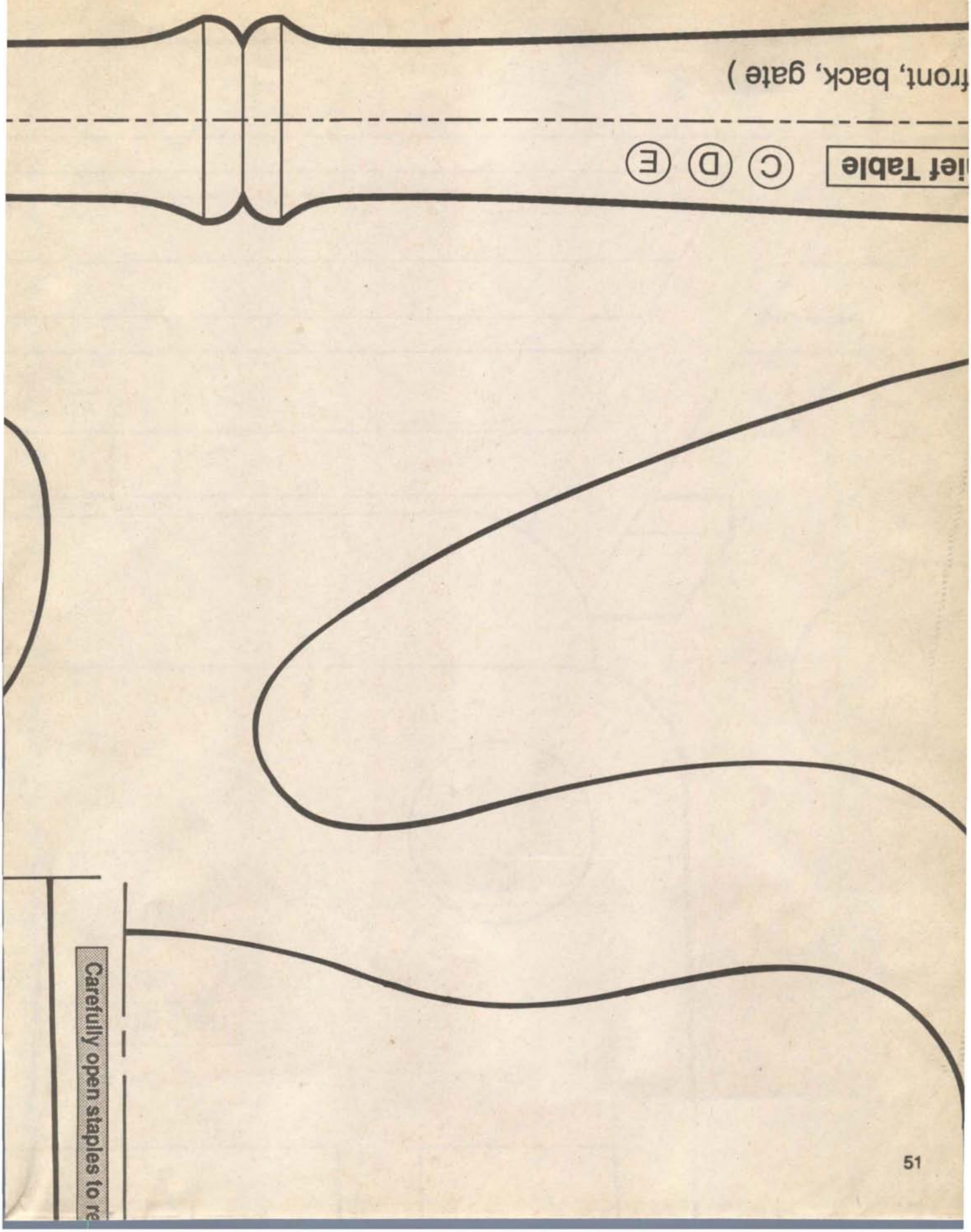


Fantasy Bird House

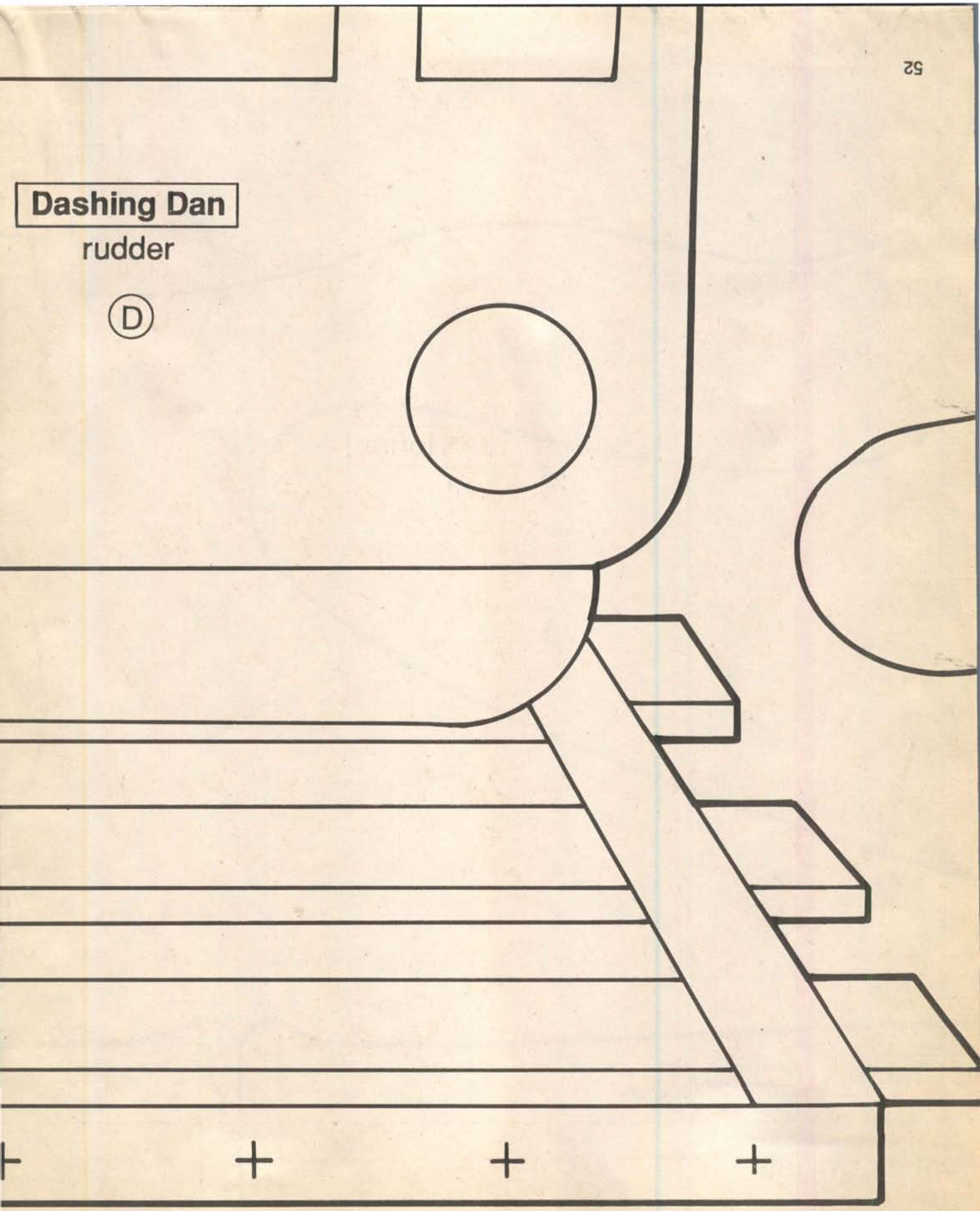
front & back

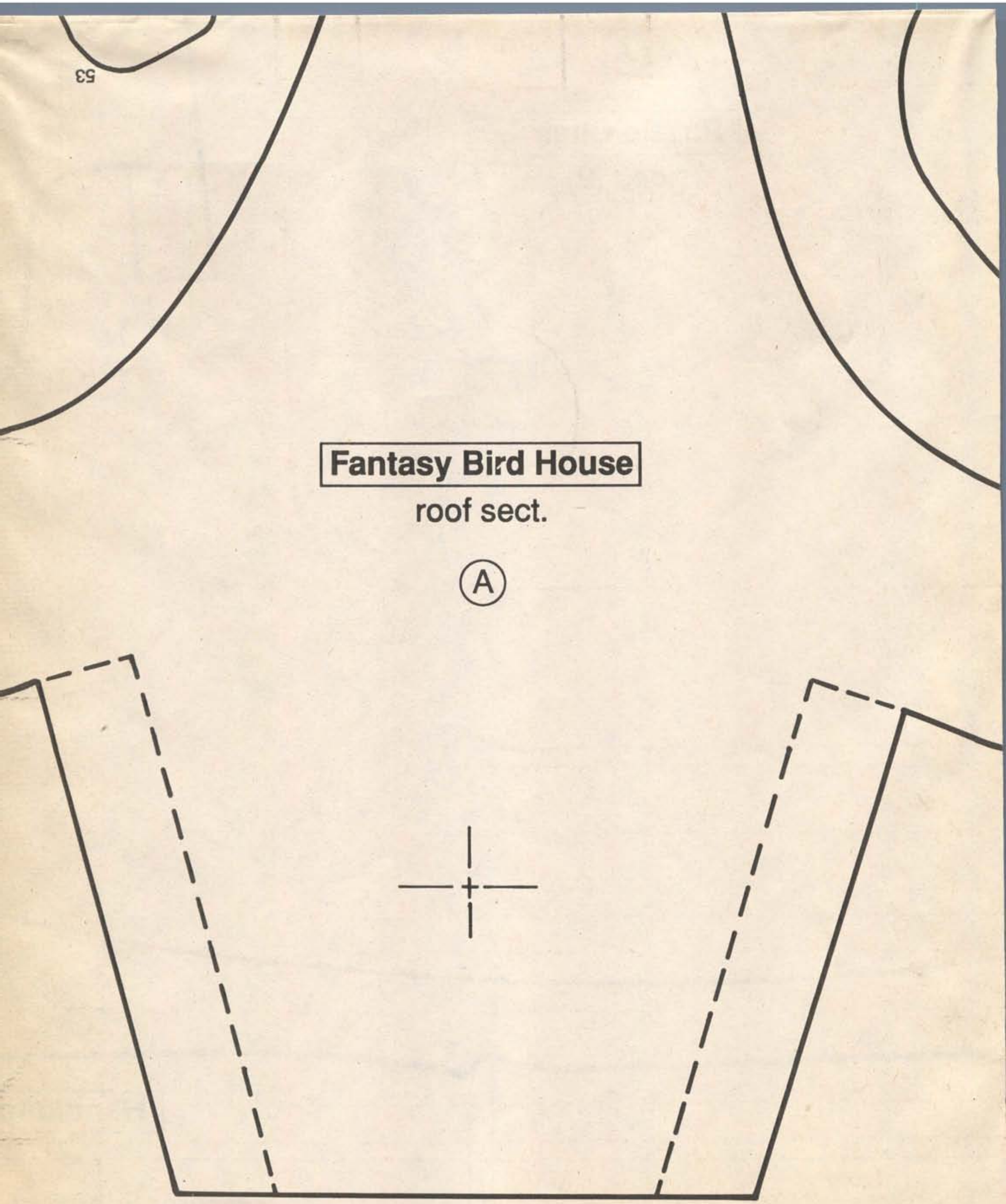

Dashing Dan
center, outer, & side body se
Ⓖ Ⓔ Ⓕ

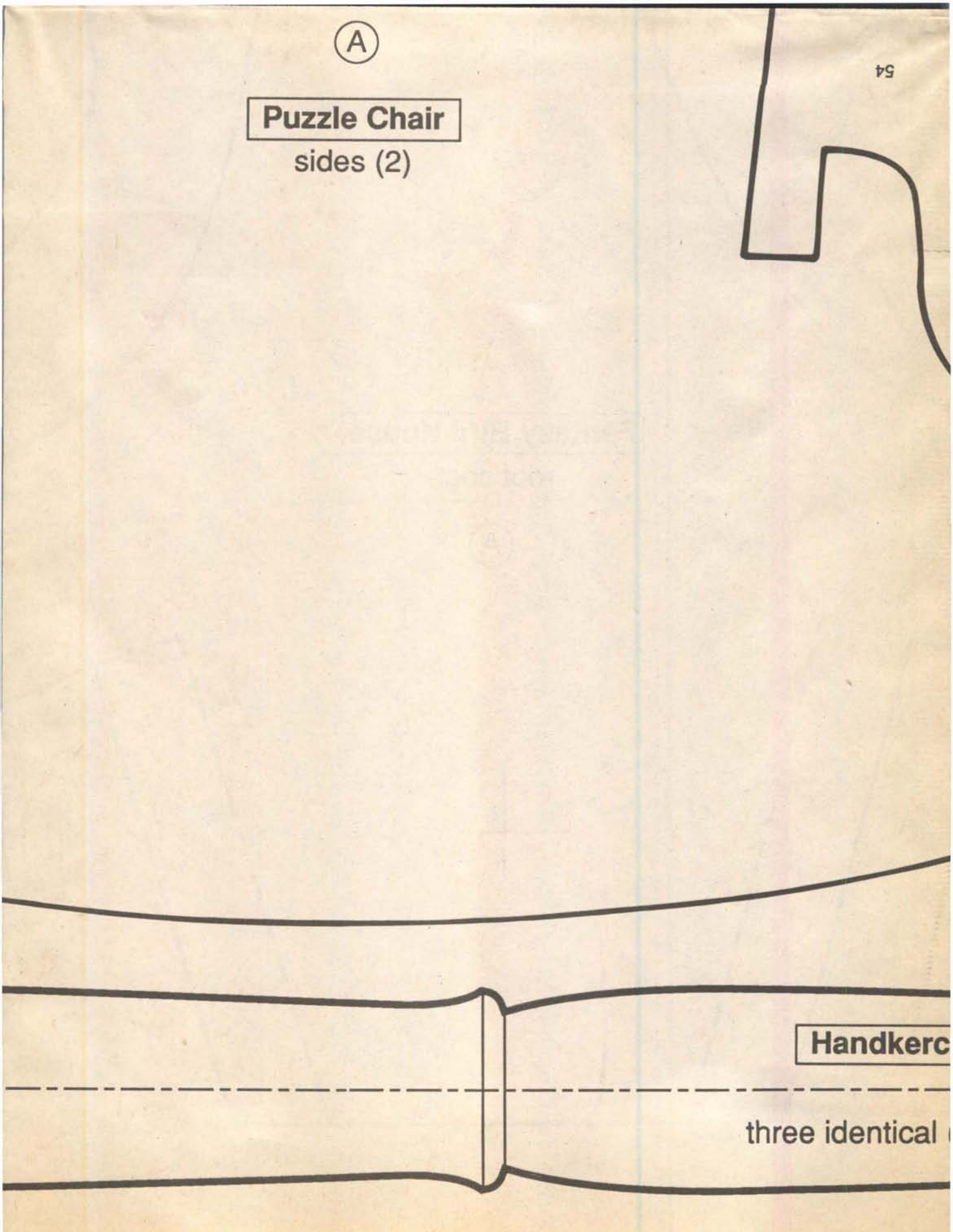

C
B
Puzzle Chair
back (1)

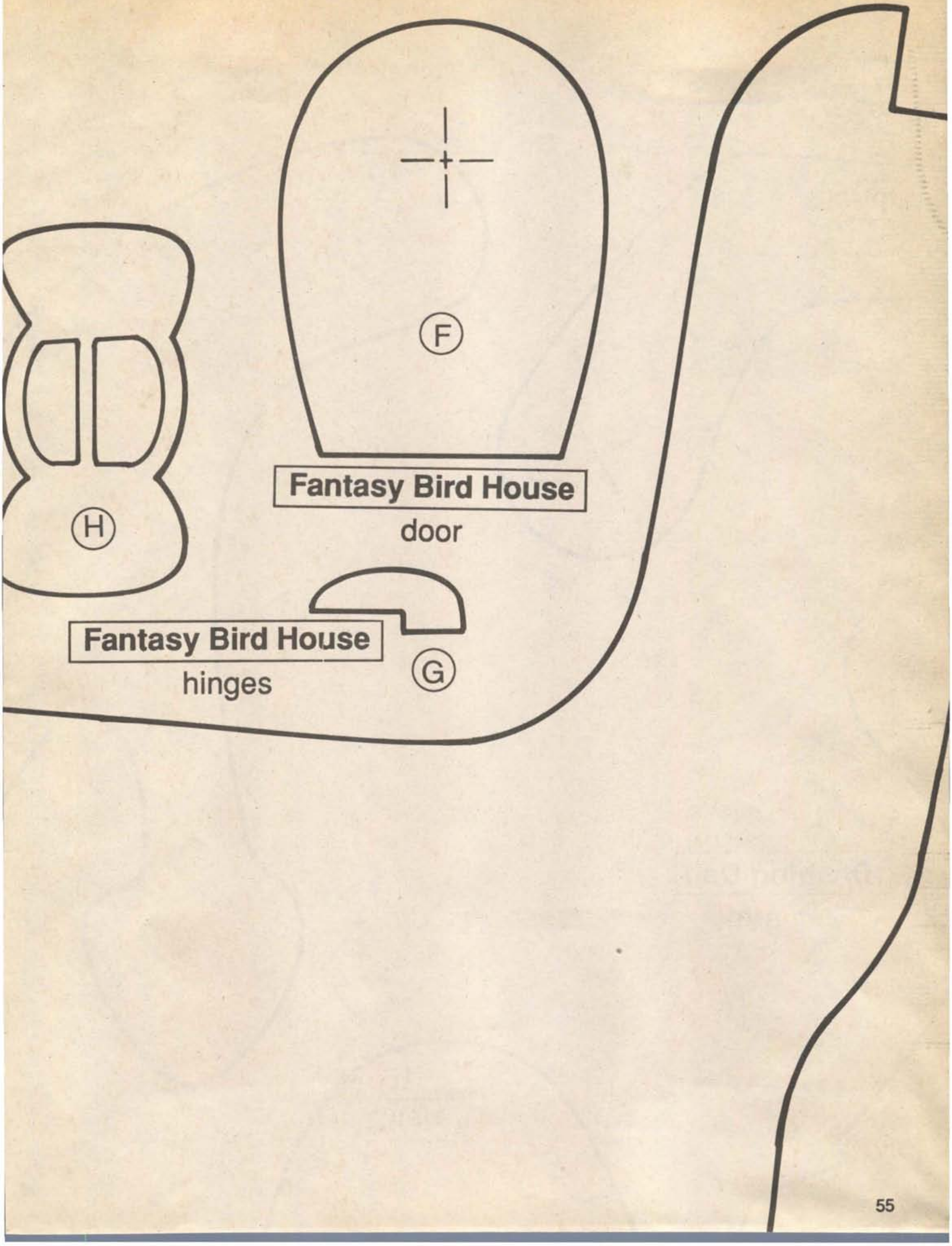


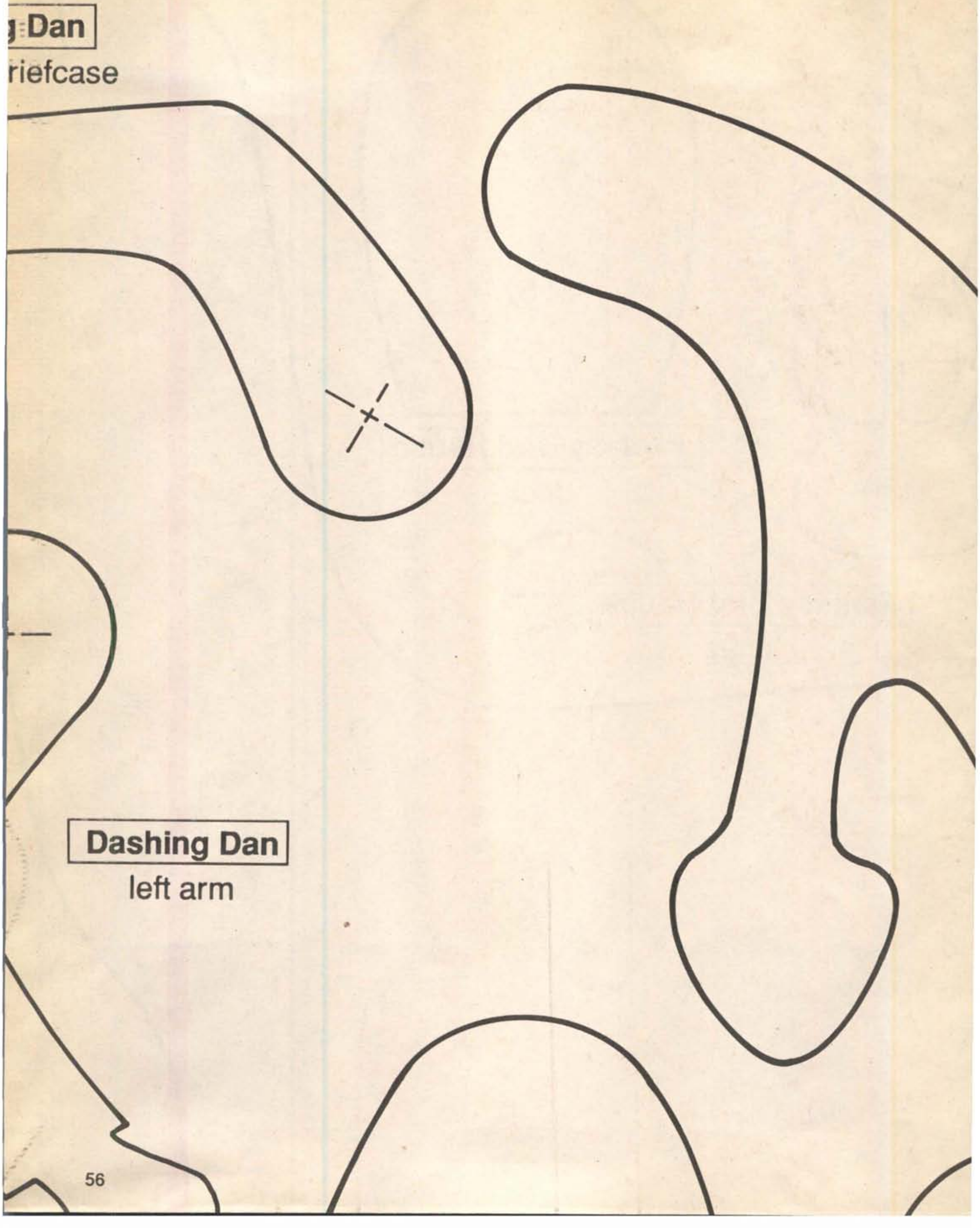
Carefully open staples to re


Dashing Dan
rudder
Ⓓ


Fantasy Bird House
roof sect.
Ⓐ

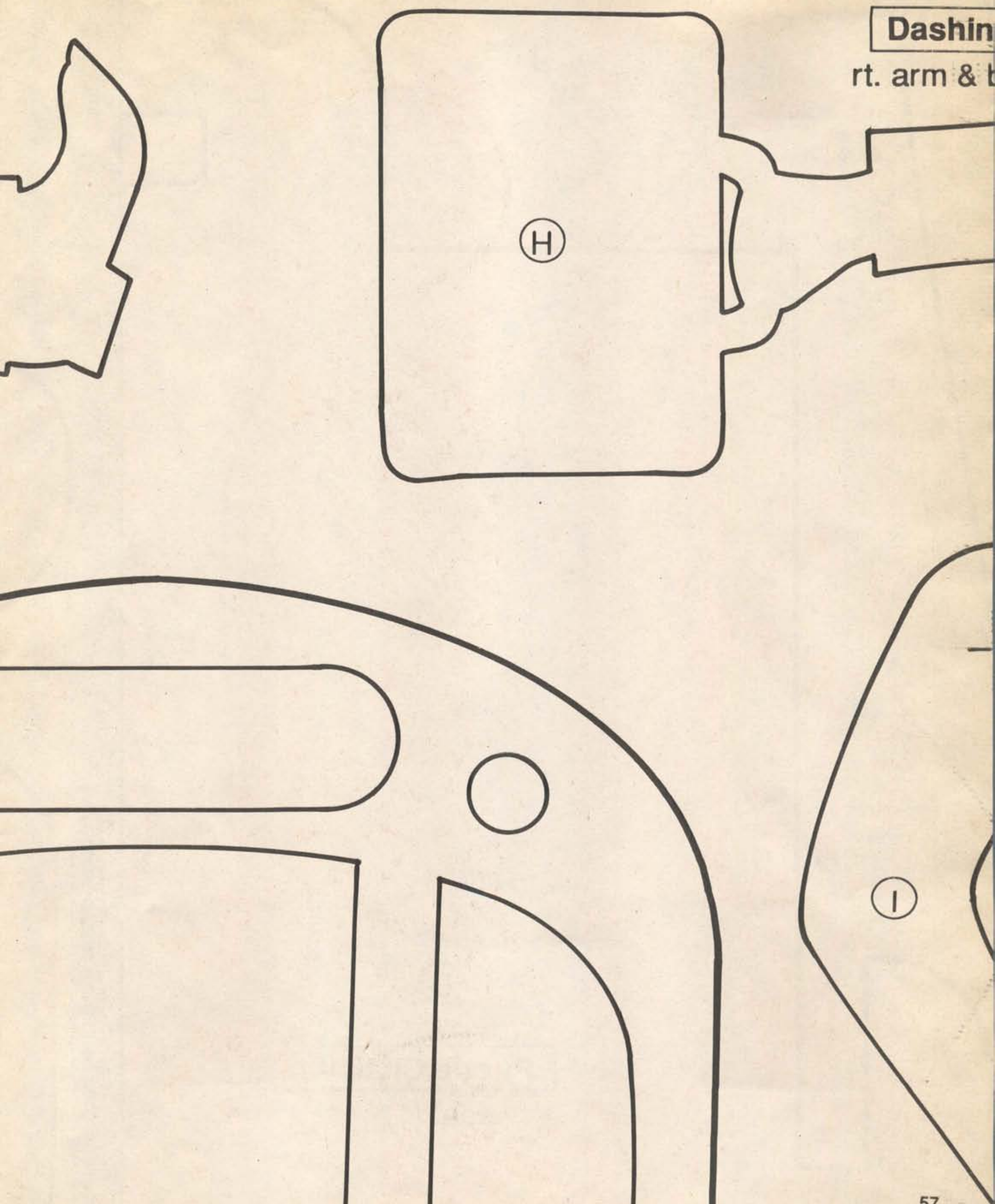

A
Puzzle Chair
sides (2)
Handkerc
three identical

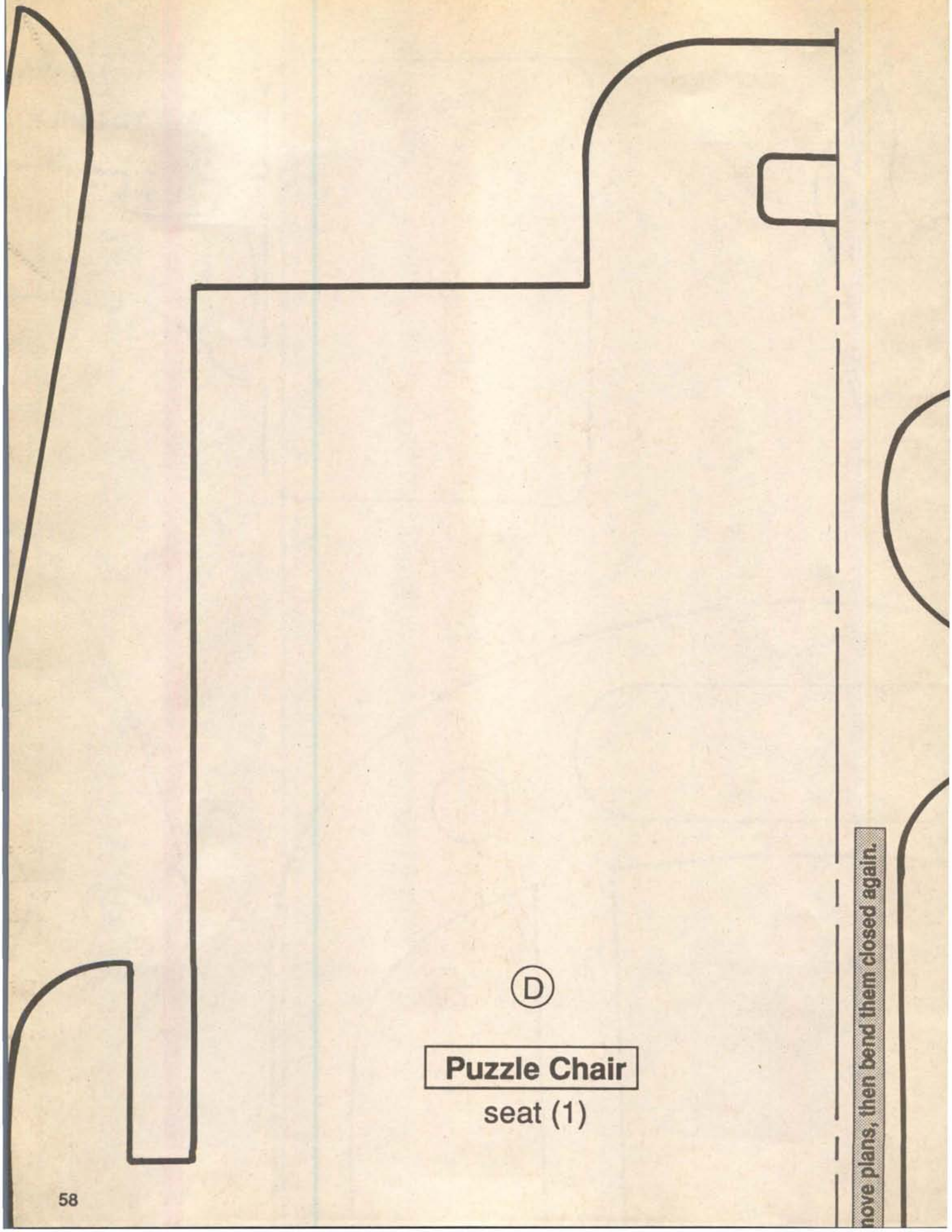

F
Fantasy Bird House
door
H
Fantasy Bird House
hinges
G


Dan
riefcase
Dashing Dan
left arm

Dashin

rt. arm & b





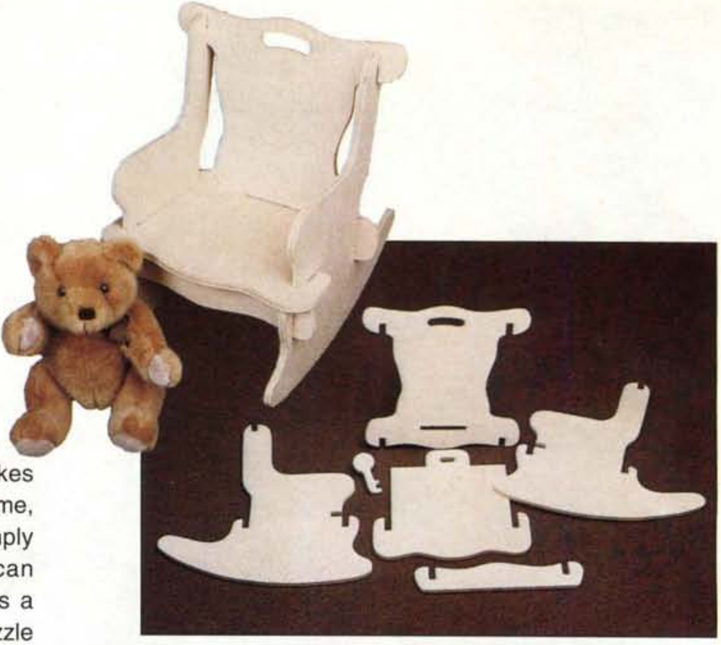
Puzzle Chair

seat (1)

nove plans, then bend them closed again.

A Popular Woodworking Project

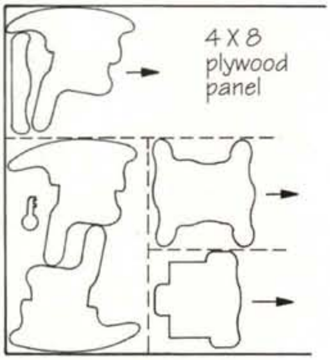
Puzzle Chair



by Devore Burch

An old fellow in Springtown, Texas makes these chairs one at a time, and though they're simply built, he sells all he can make for twenty dollars a piece. He says this puzzle chair is his invention, and perhaps it is.

Kids delight in taking the chair apart and trying to put it back together. They'll spend more time working the puzzle than sitting in it. Construction is simple—just sawing and sanding. No fasteners, no glue. Make them from ½" plywood, though you could use ⅜". Solid pine or hardwood stock is best.



Place the full–size patterns you'll find in the PullOut™ Plans on the stock, nesting them as shown in the Cutting Figure. The chair parts include two identical sides (A), one back (B), one front rail (C), one seat (D), and the locking key (E). Cut them all out with a band saw, scroll saw or portable saber saw. You'll need to drill starter holes first for two internal cuts—the handhold toward the top of the back, and the key slot in the back of the seat.

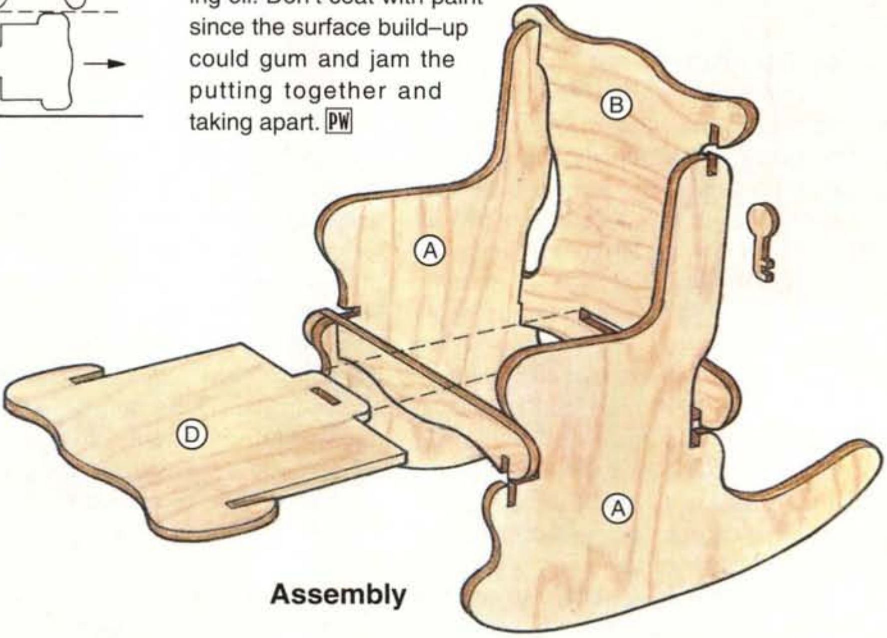
Cut the slots accurately. If they're too narrow, the chair will be hard to assemble; if too loose, the chair won't be stable. The slots should be about 1/32" larger than the thickness of the stock. Sand all edges smooth and break sharp corners.

To assemble, first connect the two sides to the front rail. Then slip the back in and push the seat into place. Lock the chair tight by pushing the key into its slot, and it's ready for teddy.

To make more than one, first cut one accurate set to serve as templates. Use them to mark out the pieces on the stock.

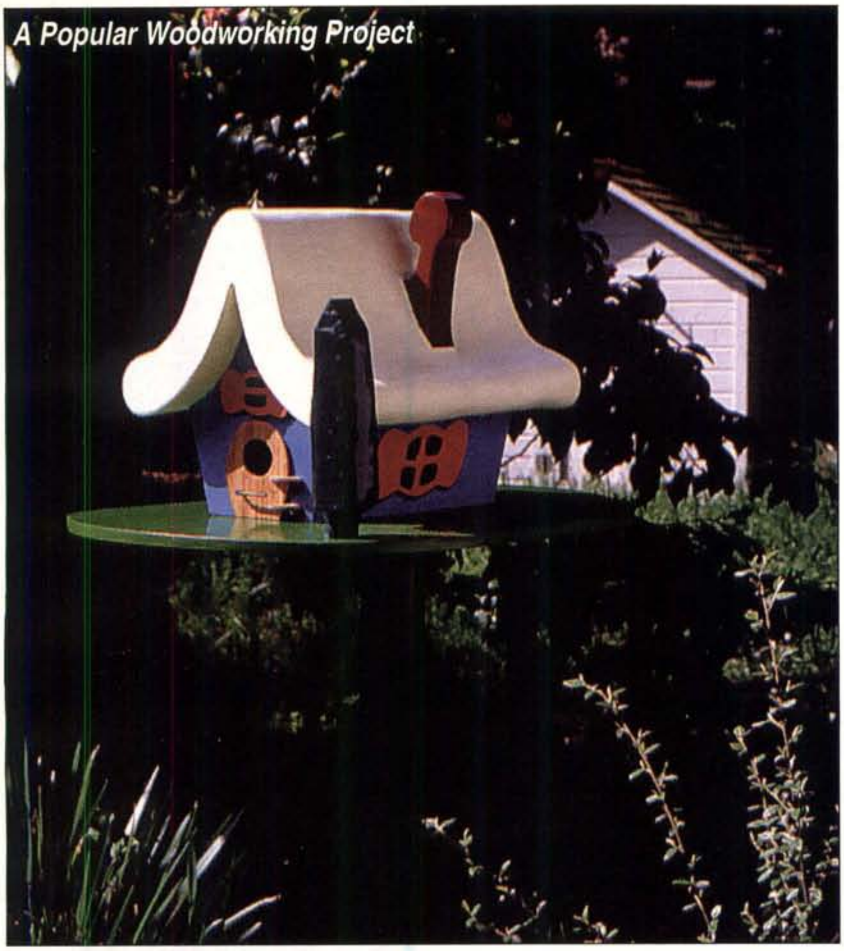
As you're sawing, keep the cut about ⅛" outside the pattern line. Screw the template to the roughed–out piece and use a flush trim bit with router. Use the template to guide the bit. All pieces will be alike and interchangeable—plus sanding is greatly reduced.

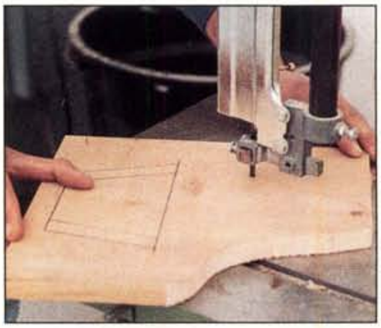
To finish, use a sanding sealer, shellac, or penetrating oil. Don't coat with paint since the surface build–up could gum and jam the putting together and taking apart. PW

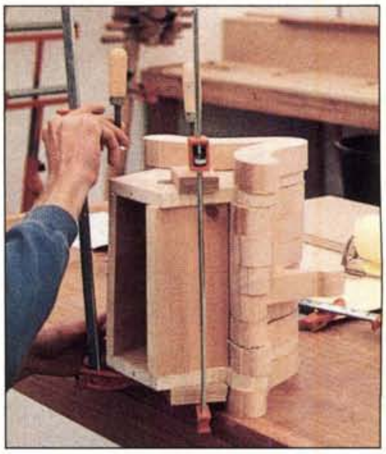


Assembly

***Devore Burch** works wood in Fort Worth, Texas.*







Storybook Bird House

by Don Kinnaman

This fanciful project will add a folksy touch to your yard while providing a home for house wrens and other small birds. You may want to keep it relatively simple, like a fairy tale transcribed by the the brothers Grimm, or you may choose to build it on a more Homeric scale. Use the following plans to begin construction, and your imagination to take it wherever your fancy wants to go.

Use 2 X 12 fir, surfaced two sides, for the roof and chimney. Transfer the pattern from the PullOut™ Plans to your stock. Make seven traces, nested together, of the roof section (A). Cut them out using a band saw or jig saw. Trace the chimney pattern (B) on the same 2" stock and cut it out. Cut out the front and back of the house (C), shown in the PullOut™ Plans, from ¾" stock. These include the front and back walls of the house.

Dry–assemble the roof segments and clamp them together. Measure the exact size you need for the sides (D); then cut them from ¾" stock. Butt–join the sides to the front and back walls. Use waterproof glue to assemble all the cut out segments in the sequence shown in the Figure on the following page. When dry, round over all the edges using a belt sander and course sandpaper. Add a slight sag in the middle of the roof to suggest the storybook effect.

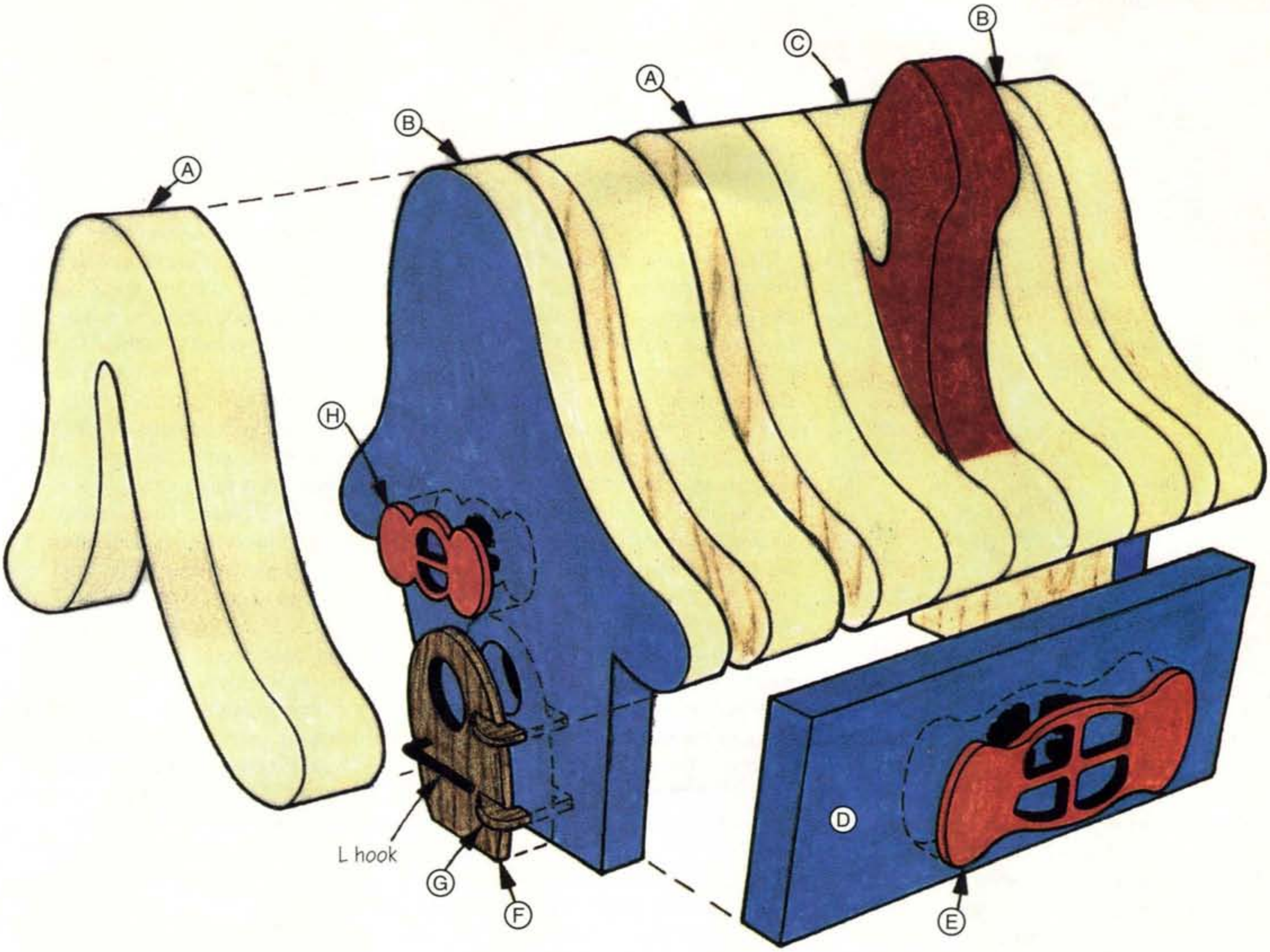
Make three windows (E) as dimensioned in the PullOut™ Plans. Sandwich three pieces of ⅛" plywood together with tape and gang–cut the

Storybook Bird House

Cutting List

		Finished Size			
Qty	**Part**	**T**	**W**	**L**	**Piece**
7	A	2"	8"	11¾"	roof section
2	B	¾"	11"	11¾"	front and back
1	C	2"	8"	12"	chimney section
2	D	¾"	4⅛"	9"	sides
3	E	⅛"	2¾"	5¼"	windows
1	F	⅛"	2¾"	3½"	door
2	G	⅛"	½"	1¼"	hinges
1	H	⅛"	1½"	5"	gable window
1	I	2"	2"	8"	tree
1	J	½"	16"	23"	base

***Don KInnamen** is a retired shop teacher from Phoenix, Arizona.*



pattern on the scroll saw or band saw. Drill four starter holes for the window mullions and cut along the lines with a scroll saw. The windows enhance the appearance; their pattern doesn't have to be exact to produce this interesting effect, consistent with the fanciful character of the project.

Make the front door (F) from 1/8" plywood or planed hardwood. Use the pattern in the PullOut™ Plans for the door and hinges. Position the door in the center of the front wall and drill a 1" hole through the door and front wall. The door handle (perch) is an L hook. Make the gable window from 1/8" plywood and follow the pattern in the PullOut™ Plans.

Make the front yard tree (I) from a 2" X 2" X 8" pine block. Lay out a pattern line on two sides, then bandsaw one side. Tape the cut pieces back together so the block is whole; then turn it and carefully cut the other side. Whittle the tree to shape, but don't sand it so it has a natural, rustic look when painted.

Cut out a freeform base on the band saw from 1/2" waterproof plywood. The shape and size of the base can be varied. It only needs to be large enough to accommodate the house and the tree—make it larger to give the appearance of having a lawn. Fasten the tree and the house to the base with 1¾" countersunk drywall screws. The base acts as a floor for the house when assembled, but can can be removed for cleaning.

Use exterior paint to finish the house. Paint the base a light grassy green, the tree a darker forest green, and the inside of the windows black. The house, roof, chimney, and window sashes can be painted like ours, or with whatever colors your imagination sees fit. Once you've built one and worked up a design variation that suits you, consider using different hardwoods, protected by a weatherproof finish.

A Popular Woodworking Project

Making Bow Saws

by Bob Laney

Bow saws are among the most handsome of tools, and they have several advantages over other saws for many of our shop tasks. When used for crosscutting or ripping, their narrower, tensioned blade binds in the kerf less than an ordinary handsaw blade.

The scroll bow saw, or turning saw as it was called by oldtime craftsmen, surpasses the coping saw when cutting curves in thick or wide stock. Unlike the bandsaw or stationary powered scroll saw, you can bring it to the work.

While a portable electric jigsaw does the same job, I've found that securing work upright in the vise and cutting curves with the turning saw is often easier than clamping stock flat for the jigsaw. Too often the jig saw's motor housing conflicts with the clamps.

For cutting firewood or downed limbs and general pruning around the yard, a firewood-cutting blade in a bow saw is a joy to use. It feels better to my hand than a metal-framed bucksaw, and its added weight aids in cutting.

The two bow saws described here use an English-style stretcher mortised into the upright arms. Continental bow saws use a slotted stretcher through which the arms pass. Featured here are a crosscut bow saw and a turning saw. The thickness of the stock, length of the stretcher, and the type and size of hardware vary according to the type and length of blade you'll use. If you want a firewood-cutting bow saw, use the stock dimensions and hardware as shown for the crosscut saw, and determine the length of stretcher by the length of the bucksaw blade you purchase.

Although the turning saw earned its name by the way its blade can be rotated in the frame, you'll note that the hardware in these plans will allow whatever type of blade you use to do this. This feature permits the crosscut saw's blade to rotate for ripping. A saw with a bucksaw blade can cut off limbs flush with the tree trunk.

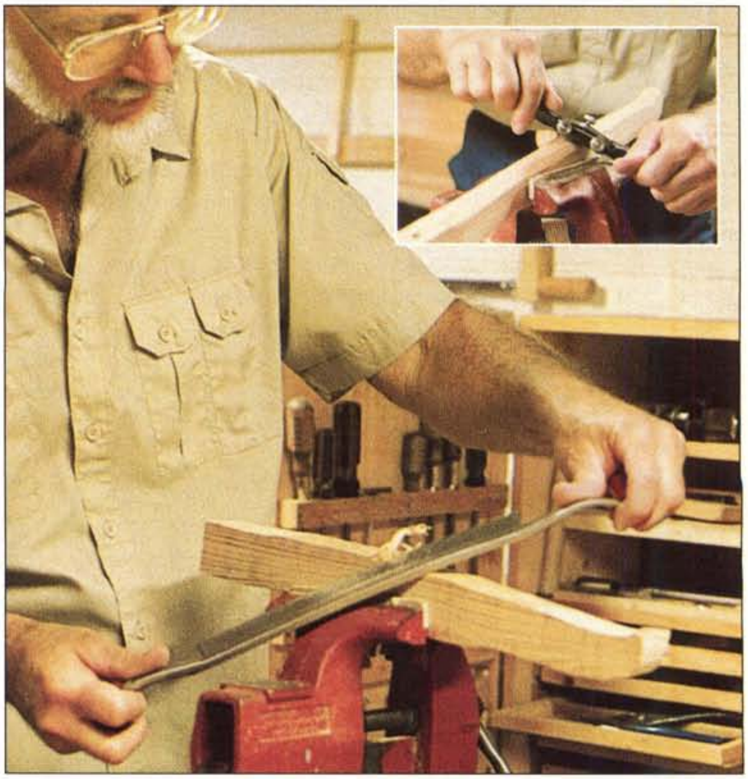
Start Shaping

Acquire the blades you want to use, and the hardware in the Supplies List, before you start building the project. You'll use the blade length to determine the exact length of the stretcher.

Cut the arms (A) to the dimensions given in the Cutting List. The sizes given are for the crosscut saw. For the turning saw, the arms are 13/16" thick. This gives the turning saw better proportions. A hardwood such as oak or maple works well. As an alternative, I used Southern yellow pine for the crosscut saw shown in the photos and it has proven to be a good choice. Although classified as a softwood, yellow pine, like Douglas fir, is harder and tougher than some hardwoods. For the turning saw, with its thinner arms, I used maple with a mahogany stretcher for contrast. Since it is under a compressive load, the stretcher can be almost any wood as long as the grain is straight and stable—a few sound knots won't hurt.

Before shaping the arms, mark out

***Bob Laney** works wood in Hendersonville, North Carolina.*



If you don't have a drawknife or spoke shave, use the leading edge of your belt sander.

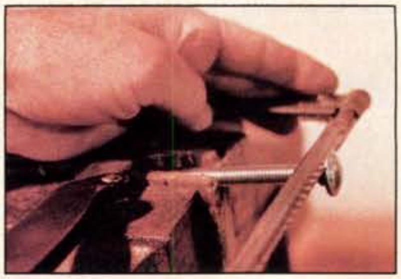
Use a bradpoint bit to drill the holes, then clean the waste with a 1/4" chisel.

and drill the holes for the blade holders and cut the mortises for the stretcher. The blade holder holes are 3/8" for the crosscut saw and 1/4" for the turning saw. Center them on the narrow dimension of the stock, 7/8" from the bottom. Locate and cut the mortises as shown below. Use a 1/4" chisel to clean up the holes.

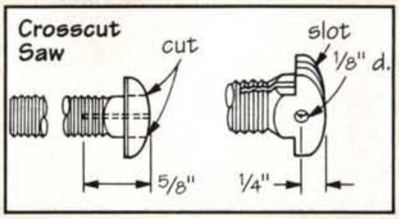
Cut the arms to shape using the pattern in the PullOut™ Plans. Note that the side of the arm with the mortise is in the same plane as the bottom of the arm where the blade attaches. You'll use this fact later to square the arms to the stretcher and determine the stretcher's exact length.

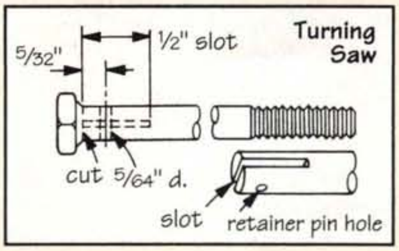
Finish shaping the arms with a drawknife and spoke shave. A small vise mounted at a convenient working height is handy for this process. The portions of the arms around the stretcher mortises and the lower ends around the holes for the blade holders are not chamfered. You can narrow the area between mortises and lower ends on the crosscut saw from the 1 1/4" thickness to provide a more comfortable hand grip. I used a Stanley 151 spoke shave with a flat sole to taper each side to a 1" width in the middle of the hand grip area. Taper the upper end of the arm above the mortise to a width of 1" at the horn. Shape both arms the same—the frame design permits the saw to cut from either end. Depending on the cutting situation, either a push or pull stroke is possible.

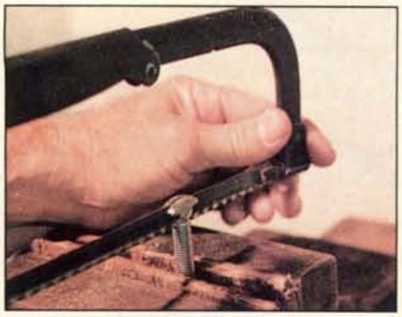
Blade Holders



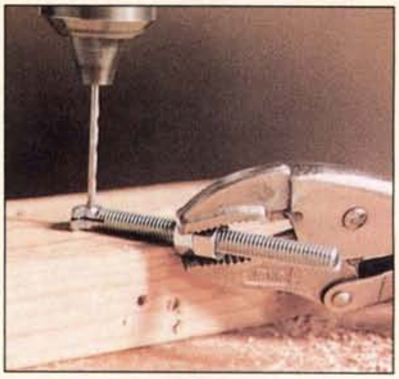
Use the square shank on the bolt as a cutting guide.



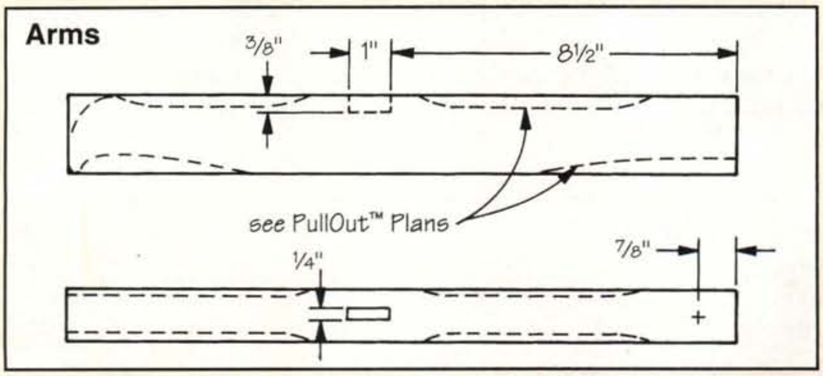


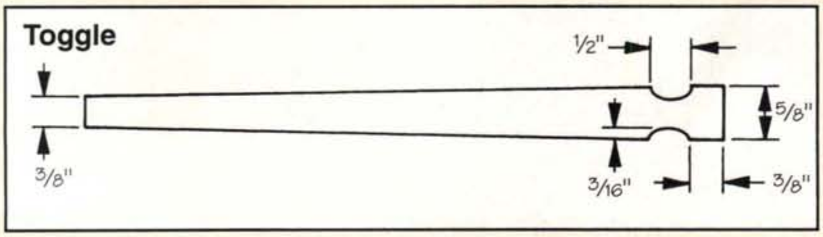


Soft aluminum or scrap wood on the jaws of the vise will keep the threads from being damaged



Use a punch to mark the location of the hole to guide the bit. Jam two nuts together for the pliers to grip.





The toggle (B) tightens the cord used to tension the bow saw. Cut the toggle from a 5/8" dowel or from 5/8" square stock. Cut a groove with a round rasp 1/2" wide and 3/16" deep, 3/8" from one end as shown in below. Taper the toggle from the notch to a 3/8" diameter at the end.

Custom Hardware

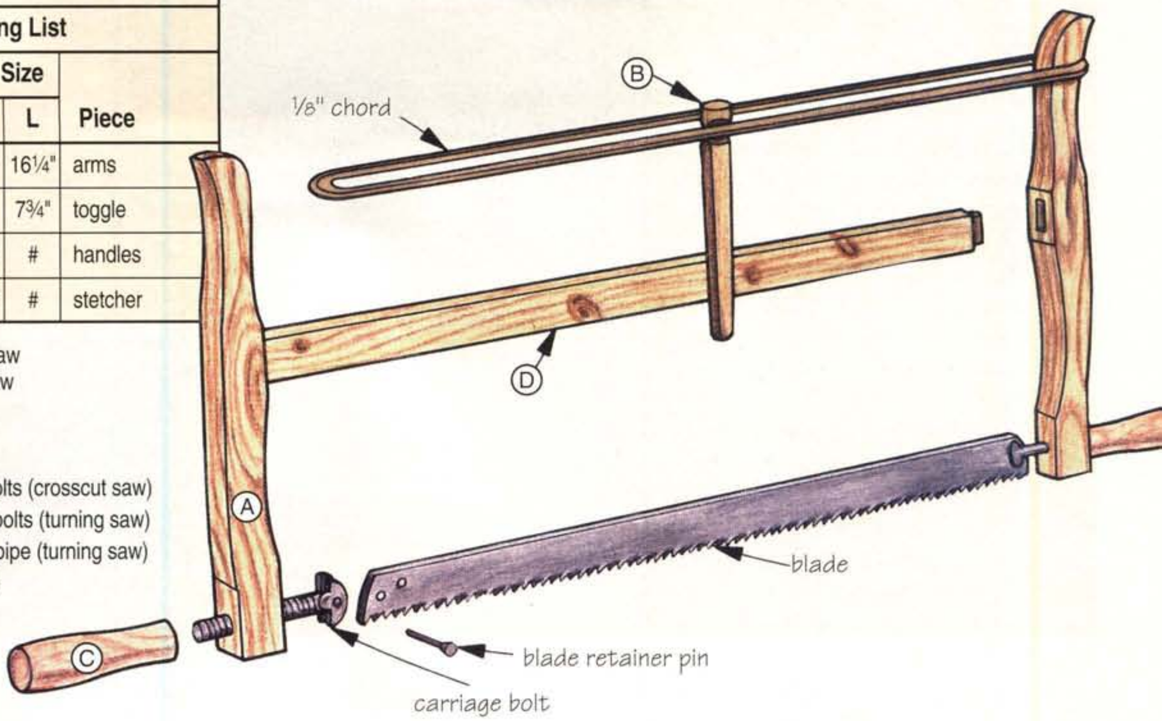
Make the blade holders for the crosscut saw from 3/8" X 4" carriage bolts. Trim the heads with a hack saw. Use the flats below the heads on opposite sides to guide the hacksaw blade. Make straight, parallel cuts. Next, saw a 5/8" deep slot in the head for the blade. If the slot proves a little narrow for your blade, pry it open. For the turn-

Turn or carve the handles to fit your personal grip.

Crosscut Bow Saw					
Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
2	A	*1¼"	1⅞"	16¼"	arms
1	B	⅝"	⅝"	7¾"	toggle
2	C	1¼"	1¼"	#	handles
1	D	1"	•1½"	#	stetcher

* 13⁄16" for the turning saw
• 9⁄16" for the turning saw
# see text for length

Hardware Supplies
2—⅜" X 4" carriage bolts (crosscut saw)
2—¼" X 3½" carriage bolts (turning saw)
2—2" X ½" i.d. copper pipe (turning saw)
1—saw blade (see text)



ing saw, use ¼" X 3½" hex head bolts. Saw off the heads; then slot the bolts ½" deep.

Drill the holes for the blade retainer pins as shown—⅛" for the crosscut blade holders and 5⁄64" for the turning saw blade. Center–punch the hole location before drilling. If drilling creates a burr in the blade slot, a pass with the hacksaw will clear it.

Turn the handles (C) for the blade holders on the lathe (see below) or make them from square stock and plane or whittle them to an octagonal shape. Use hardwood for the handles so they won't split. The ones shown are apple wood.

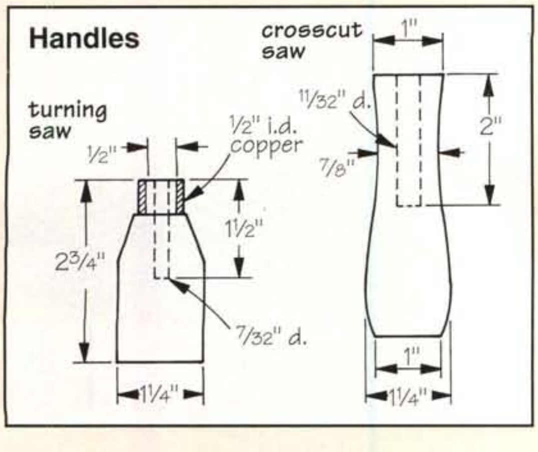
The turning saw has blade holder handles fitted with ferrules—short sections of ½" i.d. copper water pipe, cut with a tubing cutter. Turn down the ends of the handles on the lathe to fit the inside diameter of the pipe sections. The ferrules spruce up appearances a bit and add a little extra strength. I've made similarly sized handles without them and had no problems.

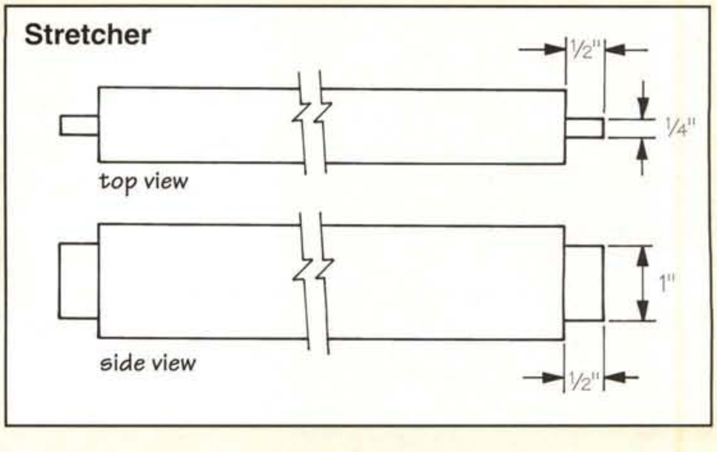
For the crosscut saw, bore an 11⁄32" hole in the end of the handle for the ⅜" blade holder; bore a 7⁄32" hole for the turning saw blade holder. These drill sizes allow the blade holders to be threaded snugly into their holes. Hold off on threading in the ⅜" blade holder until the next step.

Cut the Stretcher

Thread the ¼" blade holders into their handles. For the ⅜" blade holders on the crosscut saw, insert the holder into the hole in the lower end of the arm, with the head on the same side as the mortise; then thread the handle on. The ¼" holder protrudes ⅝" from the arm; the ⅜" holder protrudes ¾".

Pin the ends of the blade in the holders. Use 3d finish nails for the turning saw and 10d finish nails for the crosscut saw. Spread the arms until the blade is hand–taut and align its length





with the edge of the bench. With a square on the edge of the table, use the flats at the bottom and mortise sections of the arms to square the arms to the blade.

Carefully measure the distance between the mouths of the mortises. Add the length of each tenon, ½" plus ½", and cut the stretcher (D) to length. Cut the tenon shoulders as shown. Leave the ¼" thickness for the tenons. Cut the cheeks and trim the tenons to 1" width. Chamfer the stretcher edges.

Finish and Assembly

Remove blade holders and handles from the arms and sand all the wood parts. Use a flexible but firm rubber backing block for the sandpaper to sand the curves without rounding over the chamfers. Go to as fine a grit as you like—I find 120–grit satisfactory for most tools. An oil finish works well for this kind of project. I used a couple of coats of tung oil, rubbed in. When the finish is dry, reinstall the blade holders in the arms, then the handles.

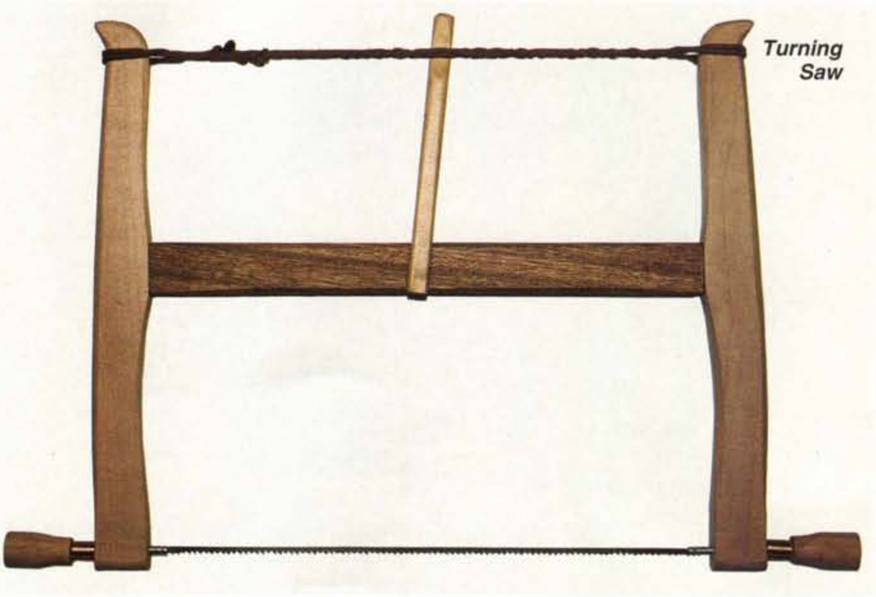
Pin the holders in the handles before you put any serious tension on the blade. You can pin the turning saw's holders before installing them in the arms, but the crosscut saw's holders have to be assembled in the handle before pinning. Use a 7/64" bit for the crosscut blade holder handle and drill through the center of the handle and the bolt. Use an 8d finish nail clipped just short of the handle's diameter, and bury the head into the wood. You can back it out of the through–hole with a punch if the handle needs to be removed.

For the turning saw, I used a ⅜" sheet metal screw through the copper ferrules, one side of the handle, and the ¼" bolt. This allows the threads to catch in the wood beyond the hole through the bolt. An ordinary countersink bit lets the screw head sit flush with the copper ferrule. If you used a plain handle for your turning saw, pin it as described for the crosscut saw—use a smaller finish nail and bit.

To string up the bow saw's tension, use a stout cord about ⅛" in diameter. Don't use a stretchy type such as nylon, or you'll be forever tightening it. Wrap the cord four times around the horns at the upper ends of the arms and tie the ends together. Insert the toggle stick in the middle and turn it around to tighten the tension on the blade–don't overdo it. Loosen the tension a turn when not using the saw.

Blades for Bow Saws

For a firewood-cutting and limb-lopping bow saw, a replacement bucksaw blade works well. A 30" length allows long, smooth sawing strokes without creating a saw of unwieldy length. Crosscut blades for bow saws are available from some woodworking tool and supply houses. Or you can make your own from a thin panel saw blade, as I did.



Turning Saw

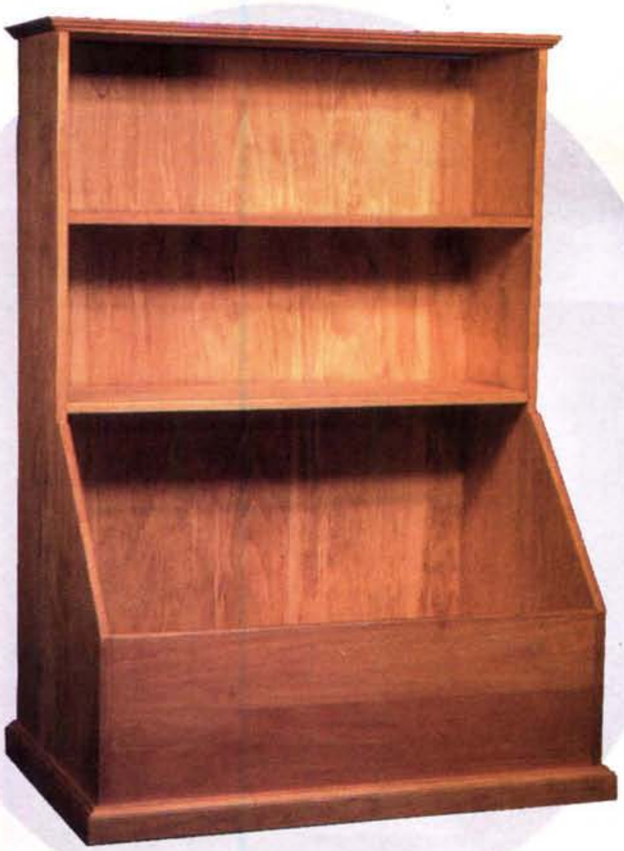
For the turning saw, bandsaw blades are an obvious choice for adaptation. I used a 16" piece of ¼" X 6 tpi bandsaw blade and reshaped the teeth slightly for better hand cutting. If you wish to reshape saw teeth, or change a crosscut blade to one for ripping, see the article on saws and sharpening in "Tried and True," Popular Woodworking #60, page 16.

To cut a bandsaw blade to length, use a cold chisel on a mild steel surface. Wear safety glasses for any metal cutting operation. To drill retainer pin holes at the ends of the blade, first anneal the steel in that area by holding each end to a brightly glowing electric stove burner until the blade end turns dark blue. Use a center punch to dimple the blade for the drill bit. Use a 5/64" bit to make a hole for the 3d finish nail retainer pin for the turning saw's blade.

For my crosscut saw blade, I bought an *inexpensive hand saw on sale*. The tip was 1½" wide and allowed me to make a full–length cut of that width. The steel blade was a bit thinner than some more expensive saws, but works fine for a blade used under tension.

If you're using a blade such as this for your bow saw blade, start by removing the handle. Measure back ½" from the toothed edge and draw a line parallel to the teeth with a thick felt–tip marker. Then use a sharp scriber to make a cutting line through the marker line. This leaves a shiny, obvious cutting line, similar to a machinist's layout dye. Clamp the blade in a metal vise with the toothed section between the jaws and the scribed line flush with the top of the jaws. Start at one end of the blade and score the line deeply with a cold chisel. Once scored, the waste section will break off when rapped smartly with a hammer. Work section by section, breaking off the waste before unclamping and moving the blade in the vise. When you've cut the full length, smooth the cut edge with a grinder and/or file. The end of the blade next to the handle on my saw was curved, so I ground a matching curve in the other end.

Most saws have a hole in the tip for hanging, but it's too large and wrongly placed for pinning in the blade holder. Drill ⅛" holes, centered in each end, ¼" from the end, for the retainer pins. Handsaws are meant to be sharpened with a file, and are generally soft enough to drill without annealing. PW



A Toddler's Toybox With Clampless Joinery

by Carl Dorsch

With our toddler's toys spread all over the house, and every horizontal surface overflowing with children's books, I decided it was time to make a toy box and bookshelf to bring better organization to our household. Instead of making two separate pieces, I designed a combined piece to minimize the use of floor space in our daughter's already crowded room. One advantage of this design is that there's no box lid to pinch little fingers or bang little heads. If you choose to add a lid to the toy box make sure to use slow–drop toybox supports.

Begin construction by planing the stock to the dimensions given in the Cutting List. Make the pieces for the sides (A) by edge–gluing ½" stock to a width of 20", and use 1 X 12 lumber for the top piece, shelves, and front.

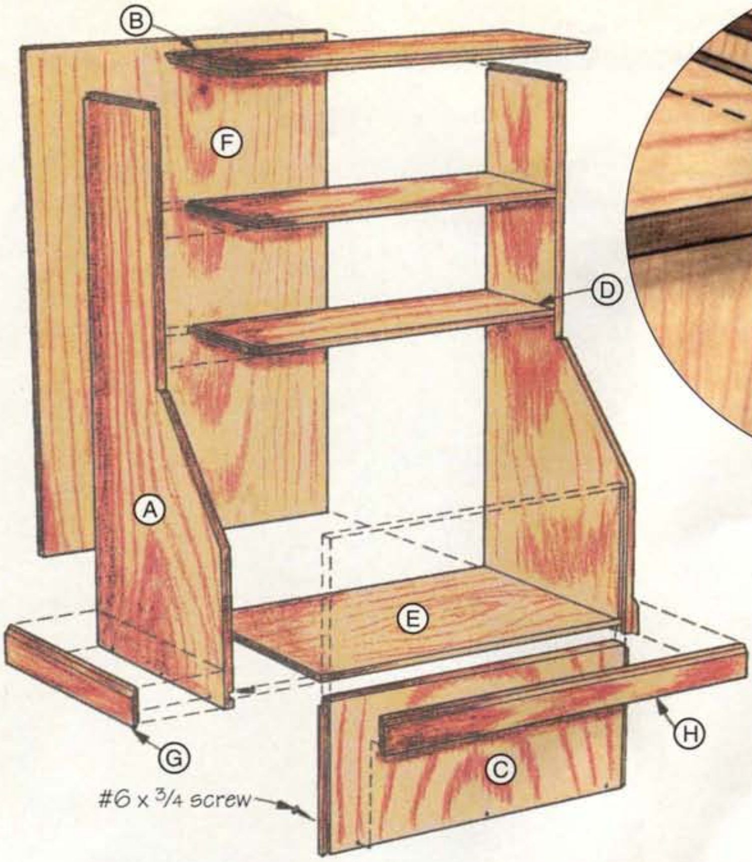
When the glued–up pieces are dry, use a hand saw or saber saw and cut the sides to the shape shown in Figure 1. Rip the stock for the shelves, top, and front as dimensioned in the Cutting List, and joint their edges. Clean the front edges of the side pieces with a bullnose plane or with a spokeshave. Finish plane or sand the inside faces of the top (B) and side pieces, then lay out the locations for the joinery, as dimensioned in Figure 1.

Cut the ¼" deep dovetail slots with a router. Remove most of the wood with a ¼" straight bit, then make a pass with a ⅜" dovetail bit. Stop the dovetail slots ½" short of the front edge so the joinery doesn't show. Using a dovetail bit and router table, cut the male portions of the dovetails on the ends of the front (C), shelves (D) and the top edges of the side pieces (A). Cut one side of the dovetail on each piece and on several ½" thick scrap pieces. Use the scraps for trial and error adjustments to cut the other side of the male dovetails. When the appropriate setting is determined, finish cutting all the male dovetails. Carefully saw or chisel the leading edge of the dovetails on the shelves, as shown in Figure 2.

Rout the ½" X ¼" deep stopped dadoes in the sides and front to receive the plywood bottom (E) as shown in Figure 1. Clean up the ends of the dadoes with a chisel. Then, cut a ⅜" X ¼" rabbet along the inside rear edges of the sides and top to accommodate the ¼" plywood back. When all of the sliding dovetails, dadoes, and rabbets are cut, rout the molding profile along the lower front and side edges of the top piece. I used a Roman ogee.

Dry assemble the entire piece to check the fit of the dovetails. Measure the carcass and cut the bottom and back pieces. When you are satisfied with the fit, disassemble the piece, apply glue to the joints, and reassemble it. Apply glue only to the bottom 3 to 4 inches of the dovetails between the cross grained front and side pieces, this leaves the front piece free to expand and contract across the grain with changes in humidity. Similarly, the joints between the sides and the plywood bottom are cross grain, and should only be glued the first 4 to 5 inches. Assemble the shelves to the sides first, slide on the top, and then slide in the front piece. Next, slide the bottom in from the rear and drive in the screws. Finally, attach the back piece with countersunk #6 flat head wood screws. Secure the rear ends of these joints with countersunk wood screws driven through slotted holes in the sides, and into the edges of the bottom piece. These screws are hidden by the base molding. Assemble the piece quickly, before the glue begins to set. The bottom and back pieces will hold the carcass square while the glue dries, so no clamps are needed to hold the joints.

***Carl Dorsch** is a research engineer and amateur woodworker from Pittsburgh, PA*



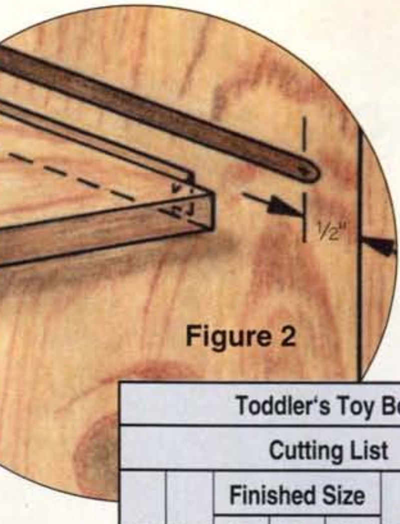


Figure 2

Toddler's Toy Box					
Cutting List					
		Finished Size			
Qty	**Part**	**T**	**W**	**L**	**Piece**
2	A	½"	20"	44¼"	sides
1	B	⅝"	10¾"	31"	top
1	C	½"	11"	29"	front
2	D	½"	9¾"	29"	shelves
1	E	½"	19½"	29"	bottom
1	F	¼"	29¼"	44¼"	back
2	G	¾"	2"	20¾"	side molding
1	H	¾"	2"	31"	front molding

Rout the bottom mouldings with the same bit used for the top piece. Miter the front edges of the side mouldings (G) and both edges of the front molding (H). Attach the front piece with glue. Apply glue to the front few inches of the side mouldings, then fasten the rear ends with wood screws passed through slotted holes in the sides, beneath the box bottom. This allows for seasonal movement between the joints.

Pine does not accept stain very uniformly—the early growth wood typically stains much darker than the late wood. To improve the uniformity of color, first apply a coat of shellac or natural oil stain, especially on end grain surfaces. This clear undercoat also improves the color match between the pine carcass and the plywood back.

I finished my daughter's toy box with a maple–colored oil stain and didn't put any other top coat finish on it. It was actually an experiment. I intended to seal the wood because I was considering painting and stenciling the piece when our daughter moved to her new room. However, as the piece has aged, I have grown to like the color the surface has taken on. PW

Dovetail, Rabbet and Dado detail

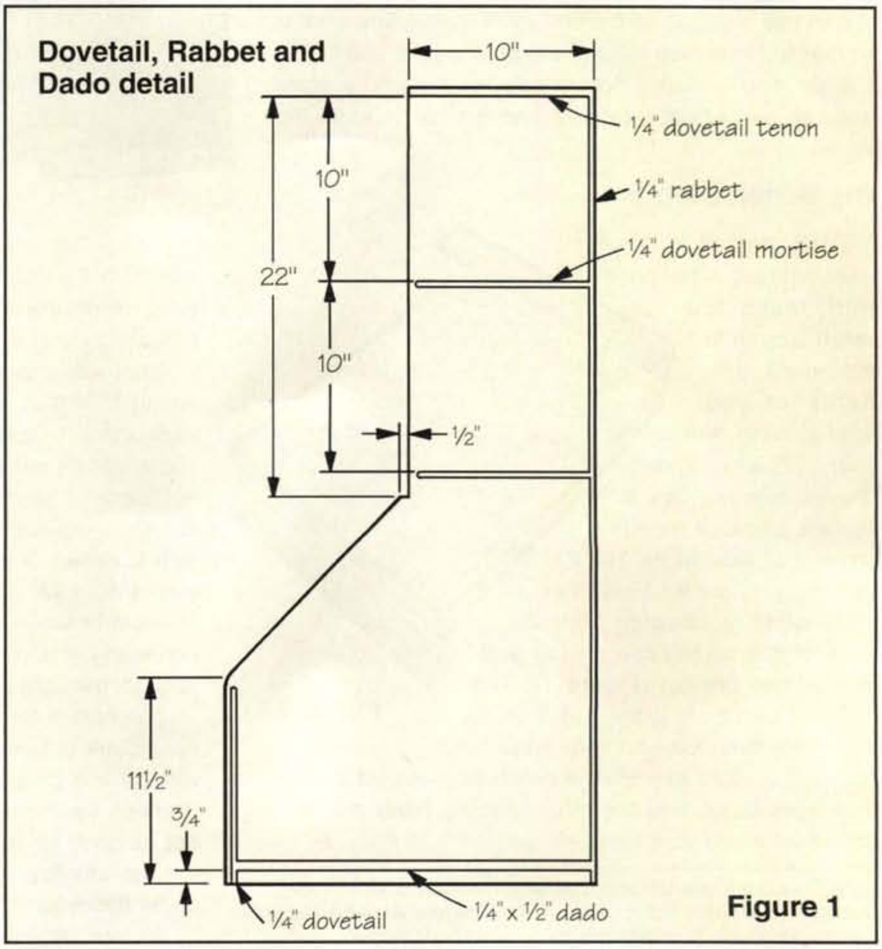
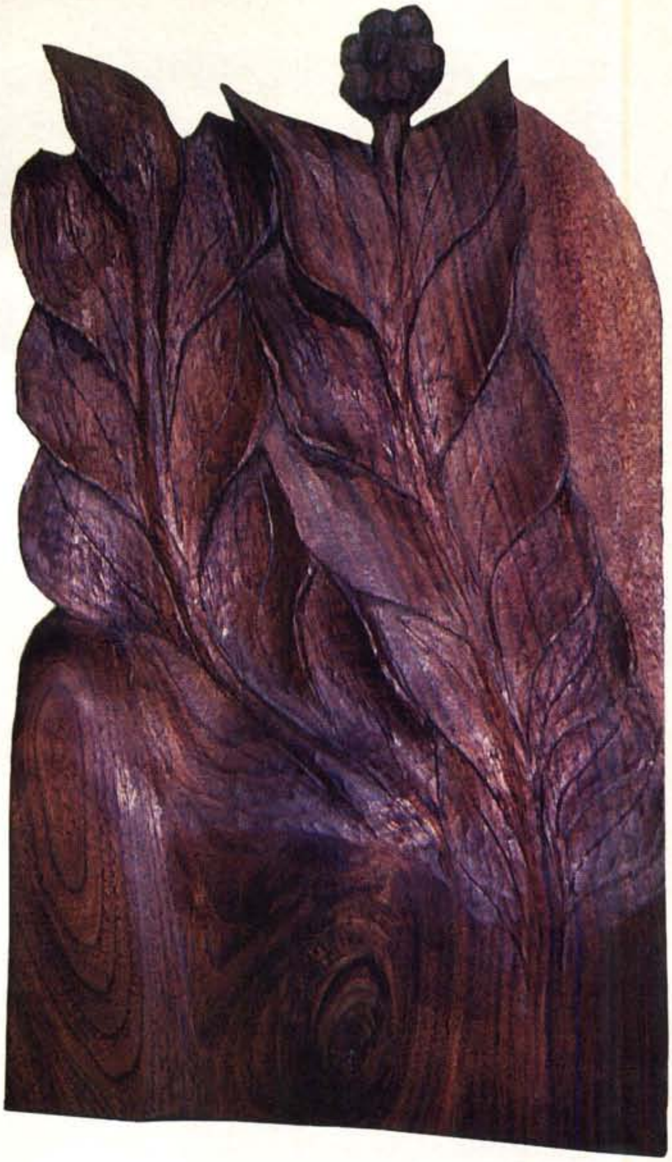


Figure 1

Relief Carving

Flower And Leaves



by Jack Ekstrom

This project is for beginning carvers who want to learn how to use a gouge. In the end you'll have a fine work of art that will look nice either hung on a wall or laid flat on a desk. You'll need a coping saw, gouge and a skew chisel to execute the carving, and a strop to keep the blades honed.

The Bench Stop

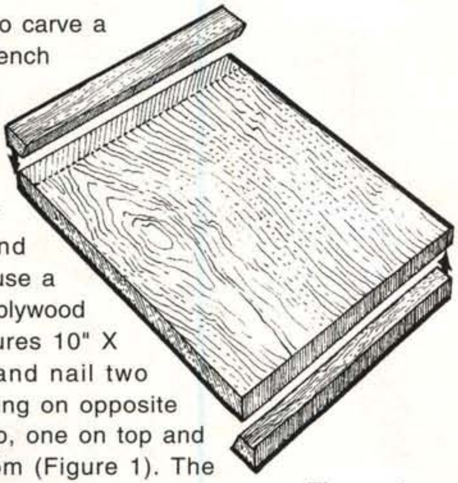


Figure 1

Don't attempt to carve a relief without a bench stop. Make the bench stop to fit the measurements of your relief carving. For your Flower and Leaves carving, use a 1" thick plank or plywood scrap that measures 10" X 16" long. Glue and nail two strips of 1" molding on opposite ends of the scrap, one on top and one on the bottom (Figure 1). The molding can be square but it works best if it's beveled—a sharp edge holds better. One molding holds the bench stop against the edge of your work table, and the other molding holds the carving. Don't hold it with your hand.

The safest and easiest way to carve with a gouge is to use both hands. A bench stop allows you to do this. You have twice the strength and control when you use both hands.

Start with a plank of basswood, cedar, or mahogany measuring 1" X 8" X 15". Don't use pine or fir or you'll miss the excitement. In good woods the grain seldom splits, and the waste comes out in clean chips. You're using a hand gouge, not a mallet gouge, so don't use a wood that's harder than the three mentioned above. You'll ruin the tool if you hit it with a mallet. If you hand–carve in hard woods, you'll get frustrated. Even basswood, cedar, and mahogany, come in different densities—mahogany can be especially hard. If you can easily scratch the wood with your fingernail, you've probably got the right piece.

The outline for this project (Figure 6) is from a carving by Fred Clark of Colorado Springs. It is shown at 33% of actual size. Use a zerox machine to enlarge the image. Although Clark carved his original from walnut he says, "Dark wood is not as good for relief carving as lighter wood, because seeing the shadow is important in deep carving. Don't carve under fluorescent lights because they destroy the shadows."

Several different flower outlines are provided in Figure 9,

***Jack Ekstrom** is a writer and illustrator from Colorado Springs, Colorado and former editor of* The Mallet, *the journal of the National Carvers Museum, for which this column has been named.*

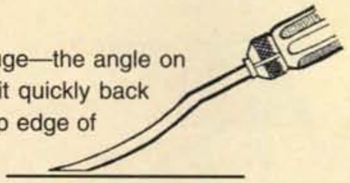
Safety Note

You push a gouge to carve—and that's its main hazard. If you're not careful, you can easily push it into your hand. When you push the knife into the wood, you also push the wood. Without a bench stop, your natural tendency is to hold the wood and that's when you're most apt to push the gouge into yourself.

Safety Rules For Carving

1. Never carve toward yourself.
2. Keep your fingers and hands out of the way of the knife.
3. Have an adhesive bandage handy.
4. Never force the gouge.
5. Take shallow cuts—you can carve deeply by gouging a little at a time.
6. Keep your gouge sharp. A sharp tool is safer than a dull tool.

Sharpening



Use a leather strop to keep the edge on your blade. Notice the bevel of your gouge—the angle on the bottom edge. To strop it, hold the bevel perfectly flat on the leather, and move it quickly back and forth in a curve that matches the curve of the gouge. Pull downward so the sharp edge of the tool leaves the surface last. If you hold your tool too high you'll dull it, hold it too low and it will not get sharper.

When your tool needs extensive sharpening use an abrasive surface such as silicone carbide paper or a hard Arkansas stone. Angle the tool bevel against the surface then push the tool forward as though you're carving with it. To strop your tool you pull it backwards and down; to sharpen it you push it forward and up.

and are shown at 55% of actual size. The tulip is the easiest. If you use a different flower you should change the leaves to fit. The rose has smaller, more numerous leaves and don't forget the thorns. Learning this basic technique for carving leaves and flowers allows you to carve the plants of your choice.

Transfer the pattern, then set your wood on your bench stop with the flower near you. Alter the pattern to follow the wood grain. Fred carved his stems to follow the curved grain of the wood. Wood with a curved grain is more of a challenge.

Adjust your seat so your forearms are horizontal when you're using the gouge. You need to be able to apply downward leverage, and that's easiest to do if you're over your carving.

Leaves

Carve the leaves first. Carve most of the leaves upside–down, for one main reason: your gouge will get stuck in the wood if you carve the outside edges of the leaves the other way (Figure 2).

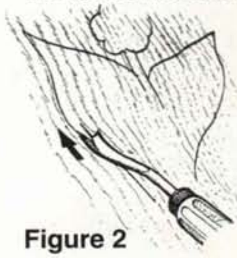
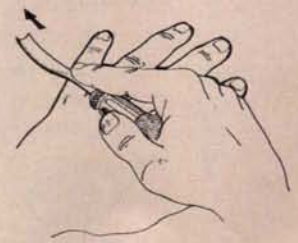


Figure 2

Hold the tool with both hands. Start with the top leaf and gouge the curved outside line of the leaf from the top point to the stem.

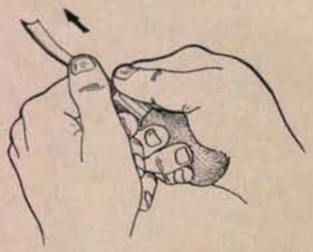


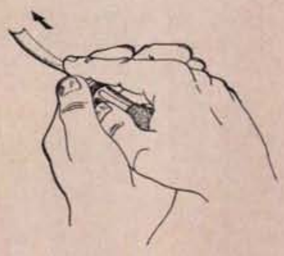
Basic Push–Cut

Hold the gouge tightly with your forefinger either on top of the tool or around it. Rest a hand on the wood, and place the gouge on your little finger with the rest of your carving hand on top. Make short pushes, raising your fingers to help control the tool.

Thumb Push–Cut

Rest all your knuckles on the wood and push your thumbs together as you also push your gouge forward with one hand. Hold the tool tightly with the thumb of your carving hand. Your other thumb guides the tool and holds it against the wood. You can do very carefully detailed work by pushing the tool with your other thumb.



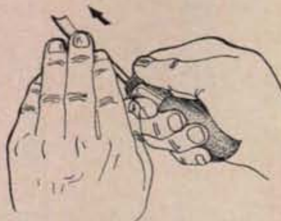


Two–Handed Push–Cut

Turn your non–carving hand upward and grasp your carving hand, plying with your knuckles.

Fingers Push–Cut

Hold the gouge with your carving hand as in the thumb push–cut, and control the cut with the fingers on your other hand.



Cut $\frac{1}{32}$" deep. This is a classical S–curve, which you'll use often in this carving. Control the curve with your wrist, and aim it with your carving hand thumb and forefinger. Your other hand steadies your carving hand and the depth of the cut. The curve is one of your major carving strokes from here on.

Try to cut the entire length of the leaf in one long cut. Make a curl of unbroken scrap as long as the leaf.

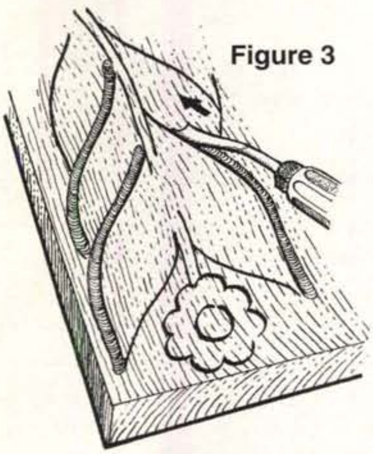


Figure 3

Repeat this cut, going $\frac{1}{32}$" deeper, until the edges of the top leaves are $\frac{3}{4}$" deep. Cut the bottom of every leaf the same way, but with each successive leaf go less deep—the last leaf is only about $\frac{1}{16}$" deep (Figure 3).

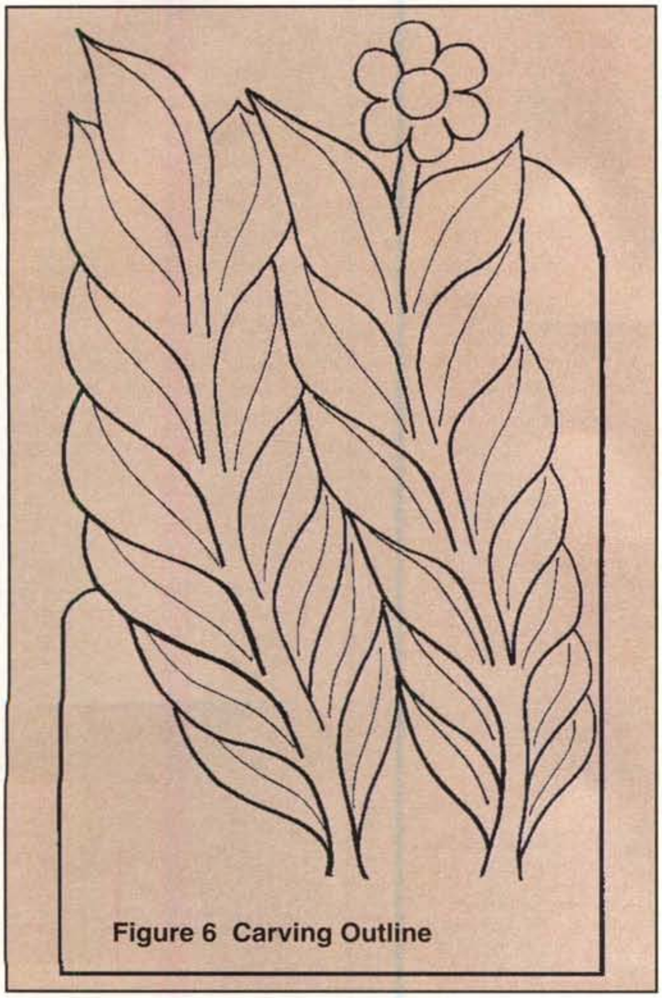


Figure 6 Carving Outline

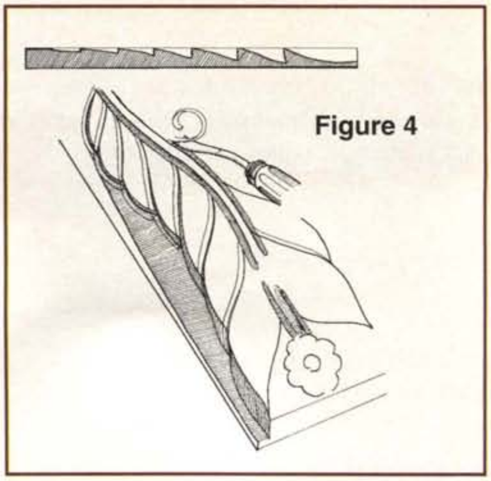
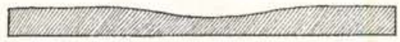


Figure 4

The Stem

Hold your gouge the same way you did for the leaves. Cut one side of the stem with the a pushcut. Start at the bottom of the first leaf and cut the other side of the stem, go all the way to the bottom of the plant. You want the surface of the stem round. Even if your stem follows straight grain, it still has a curve that goes into the wood in the middle of the stem, and out at the bottom and top (Figure 4).

Gouge the stem deeper with successive cuts on each side. Cut especially deep in the middle of the stem. You can carve just half of this scoop–curve before your gouge gets stuck in the wood. Turn your carving over, the top of the flower against the bench stop, and gouge the other half of the curve in the middle of the stem (Figure 5). Be careful not to pry with your gouge. The curve of the gouge helps with an easy scooping leverage. Follow through with the gouge as you make the cut.



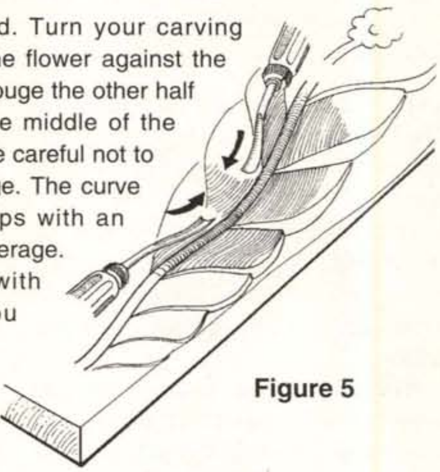


Figure 5

Finish the Leaves

As you carve the stem lower, carve the bottom of each leaf to keep them joined smoothly to the stem. Each leaf ends up with its own S–curve. The outside edge is the highest and the inside stem edge the lowest.

Under–cut each leaf. Cut straight down with your gouge along the outside edge. Angle the gouge back under the edge of the leaf (Figure 7). This is where a skew chisel comes in handy. Start each leaf by carving downward from the flower to the center of the leaf. Finish each leaf by carving in the opposite direction. Make small, easy push–cuts. As you carve upward, also carve deeper. The deepest part is the stem in the middle of its downward S–curve, and underneath the

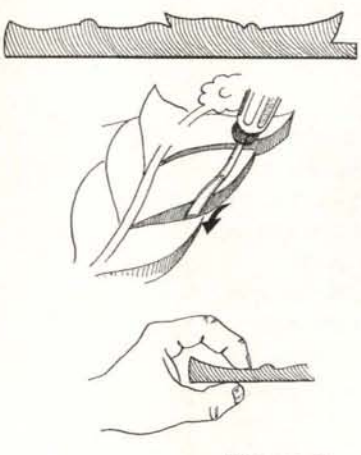


Figure 7

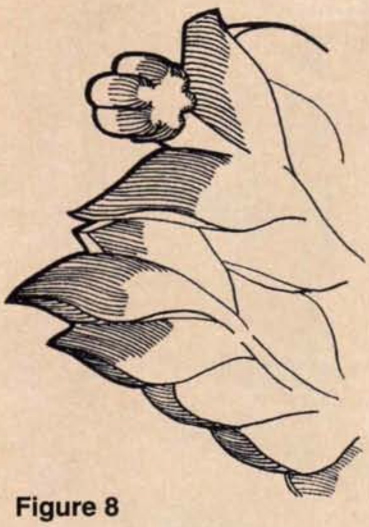


Figure 8

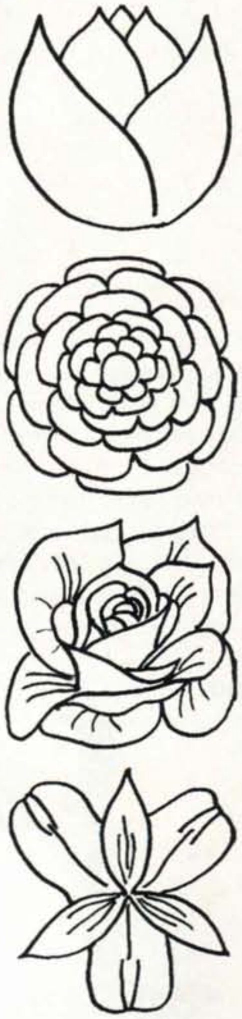
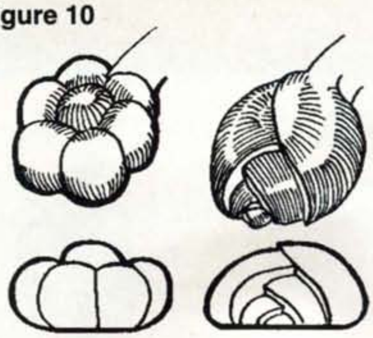


Figure 9
Alternate Flower Outlines

Figure 10



edge of the upper leaf. If your wood is a full 1" thick, carve at least ¾" deep. Test the depth with your thumb and finger.

The fun part of the carving is the center area, where the leaves overlap. Carve this area the same as you carved the first set of leaves—each leaf lower than the one above it.

Carve the Flower

The flower is last. Practice carving a flower on a separate piece of wood. Use a coping saw to outline the basic shape of the flower. Cut smoothly along the tops of the leaves and allow ¼" of stem to protrude upwards under the flower (Figure 8). Saw around the flower leaving no extra wood. Then round–off any extra corners of the plank. Make that wood part of the overall pattern.

Carve the entire top edge of the petals round, as well as the complete outside of the flower (Figure 10). Use the skew chisel to carve the lower edges of all the petals. Make the edges sharp and clean. Combine the gouge and chisel to complete the flower. In contrast with the leaves, no part of the flower is deeper than about ⅛".

Use the point of the skew chisel to V–cut lines in the center of each leaf.

Finishing

Never use sandpaper on your carving; it ruins the tool marks and the grains of sand will dull your chisel. Sand the plank where you didn't carve. A sharp gouge cuts the wood smoothly so it doesn't need sanding. Where the carving is rough, burnish or smooth it with the back of your gouge. Push hard enough to give the wood a shine (Figure 11).

Rub several coats of tung oil into the wood until it gleams. Finally put a hanger on the back so you can hang your new piece of art on the wall.

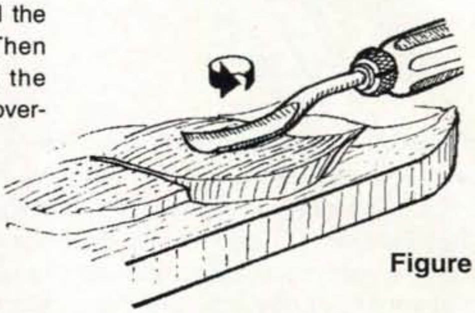
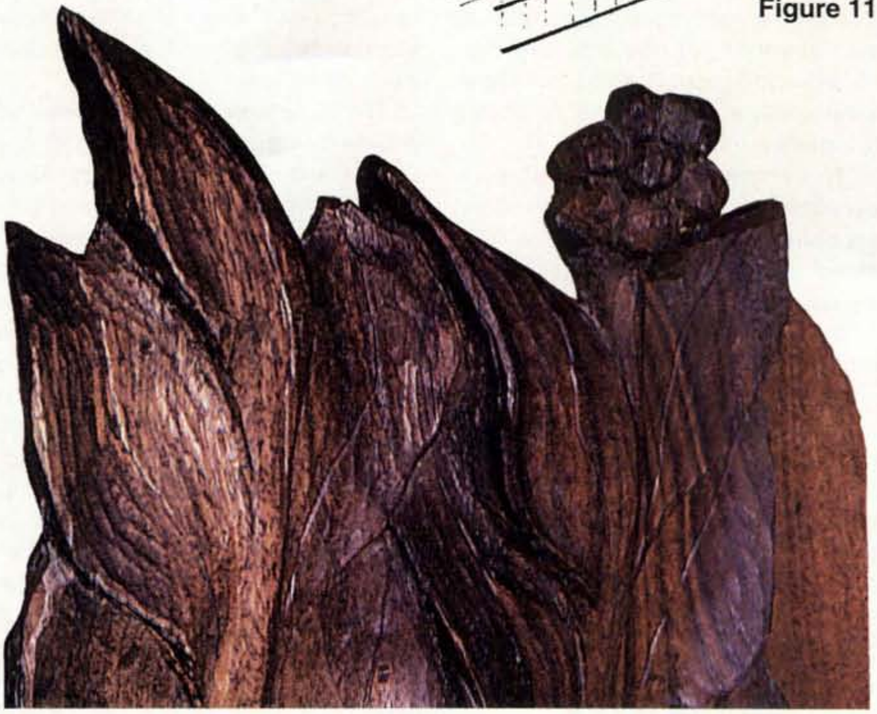
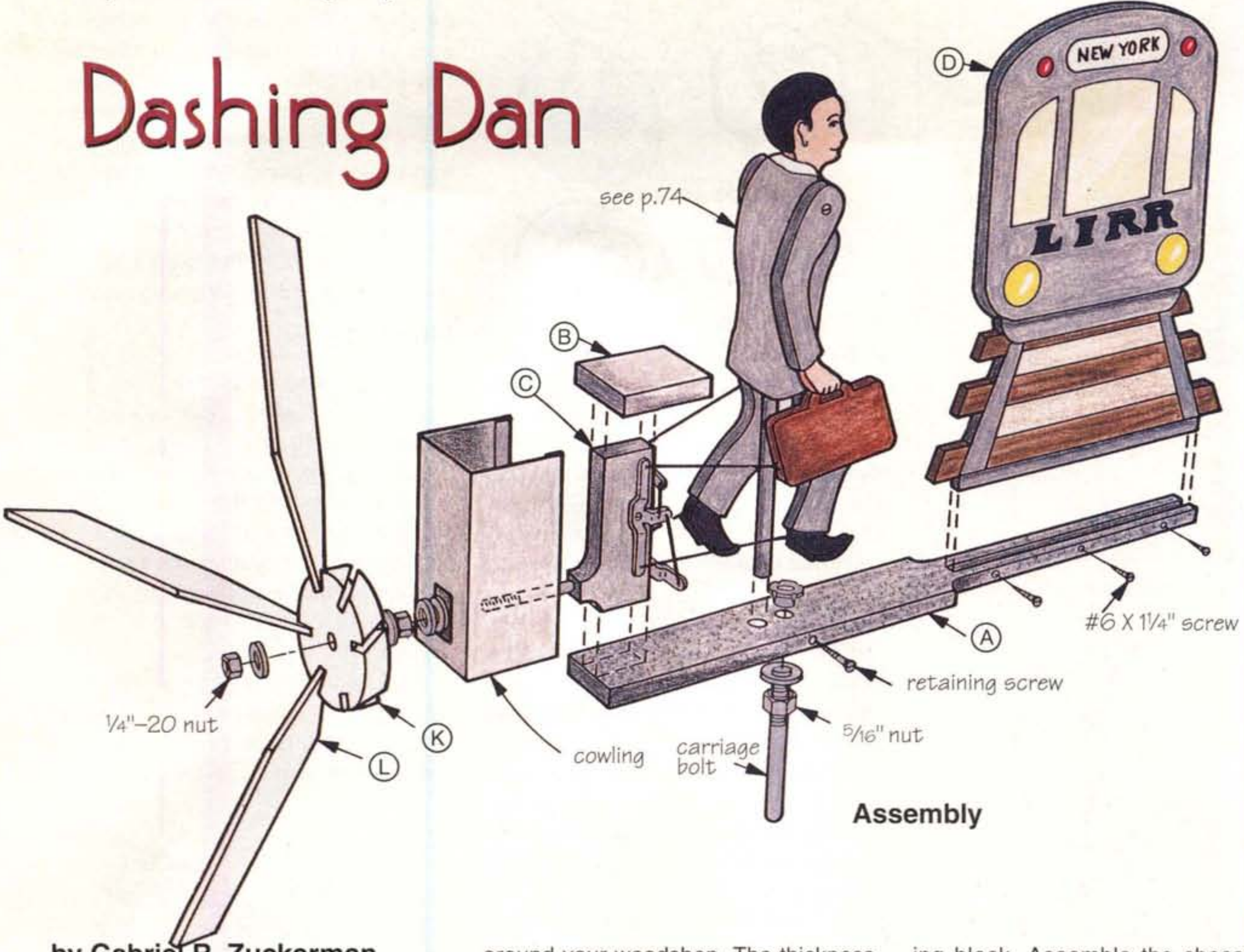


Figure 11



Dashing Dan



Assembly

by Gabriel R. Zuckerman

Wind powered mechanical toys are often used to portray the whimsical side of life. Folk artists and craftsman through the ages have enjoyed creating and observing these amusing contrivances in action. Dashing Dan represents today's commuter as he hurries to catch the train.

This whirligig is made up of six components: the puppet, chassis, rudder, propeller, mechanical system, and stand. The picture on at right shows the assembly of a simple stand made from ¾" pine or ply and a 1½" X 1½" post. It provides a good place to prop up your whirligig during construction and is used to display your completed project.

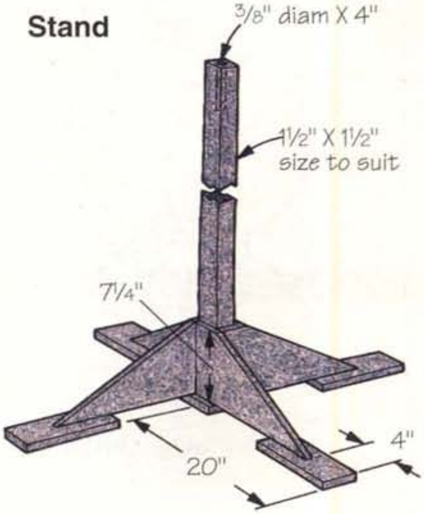
Cut out your stock to the dimensions given in the Cutting List and label each piece for future identification. Many of the pieces are small so you can make them from scraps lying around your woodshop. The thicknesses of the stock given for the puppet's body parts can be varied. The dimensions given provide a well proportioned puppet, but if you can't plane your stock to the thickness given, thicker stock will suffice.

Gabriel R. Zuckerman has been working wood for almost 50 years. His book Giant Animated Whirligigs *is available from The Woodworks, Box 207, East Northport, NY 11731*

The Figure on page 73 shows the dimensions and configuration of the chassis and mounting block. Make the chassis (A) and the cowling top (B). Cut a slot in the end of the chassis for the rudder (D). The width of the slot is determined by the thickness of the material you select for the rudder. Drill the holes for the #6 X 1¼" mounting screws used to secure the rudder in the slot. Drill ⅜" holes in the chassis for the post pivot and the puppet's support post. Make the drive shaft mounting block (C) from a piece of oak or maple as dimensioned in the cut list. Drill a ¼" hole in the block for the drive shaft and 5/64" pilot holes for the #6 X ½" screws for the T–bars and the reciprocating bar pivot. See the Figure on page 73 for dimensions of the mounting block. Assemble the chassis with brass or galvanized wood screws. Install the post pivot, shown on page 74, on the chassis and paint the the assembled parts.

Transfer the rudder pattern from the PullOut™ Plans to a piece of ¼" X 14" X 16" plywood. Acrylic or Lexan of similar thickness can be substituted for plywood—cut the slot in the chassis

Stand



Dashing Dan

Cutting List

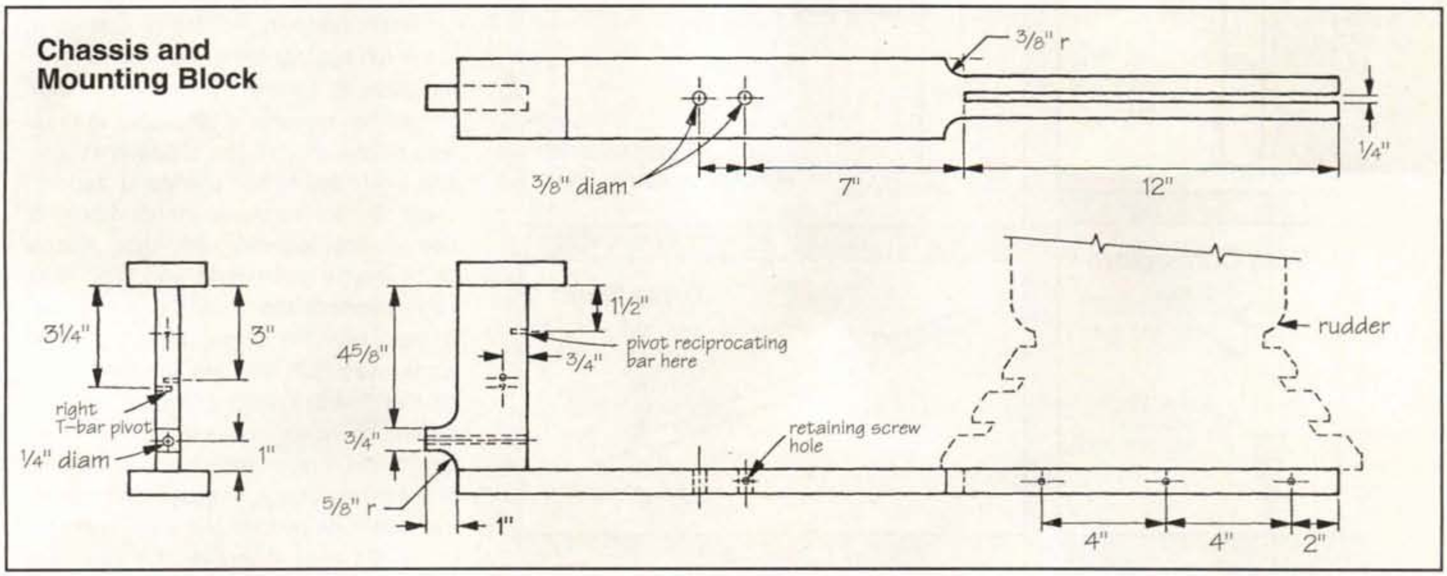
Qty	Part	Finished Size T	W	L	Piece
1	A	¾"	2½"	28¼"	chassis
1	B	¾"	2½"	3¼"	cowling top
1	C	¾"	3¼"	6"	mounting block
1	D	¼"	14"	16"	rudder (lexan)
1	E	⅝"	3½"	10½"	center body sect.
2	F	⅛"	3½"	10½"	outer body sect.
2	G	½"	3½"	10½"	side body sect.
1	H	½"	6½"	12"	rt. arm & briefcase
1	I	½"	3½"	6½"	left arm
2	J	7/16"	4"	8"	legs
1	K	¾"	4¼"	4¼"	propeller hub
6	L	¼"	3½"	12"	propeller blades
1	M	⅜" diam		4"	support post

Supplies

Qty	Item
1	5/16" T–nut
1	5/16" nut
1	5/16" X 6" carriage bolt
2	¼"–20 nuts
1	¼" diam X 1⅝" dowel or brass pin
1	.064" X ¼" X 1" crank arm
1	7/32" X 5" driveshaft
4	#4 X ½" brass r.h. wood screws
4	.032" X ½" X ¼" brass tab
1	.064" X 4" X 10" aluminum (cowling)

accordingly. Lightly sand both sides of the plywood to produce a dull matte surface that will accept paint. Paint the rudder design on both sides of the cut–out. Place the completed rudder into the slot in the end of the chassis, and secure it with three #6 X 1¼" wood screws.

Make the puppet's body by gang cutting pieces E, F, and G to the shape of the center body section (see the PullOut™ Plans). Stack the pieces in order to create the puppet's body as shown on the following page. Cut the pattern and remove the center body section (E) from the stack. Cut off the head and neck section from the remaining four pieces. Next, remove the outer body panels (F) and cut out the recesses for the legs from the remaining two side body sections. Cut out the arms and legs from the pattern given in the PullOut™ Plans. Sand the legs to thin them by 1/16". This allows them to swing freely in the recesses in the side body section (G). Drill a ⅜" hole for the support post (M) and a ¼" hole for the leg pivot in the center body section (E). Install a ¼" X 1⅝" dowel or brass pin in the ¼" hole for the leg pivot bushing. Glue the right and left side body sections on either side of the center body section. Drill oversized ¼" pivot holes in the upper end of each leg. Put one leg over each end of the pivot. Glue on the right and left outer body panels to retain the legs. Insert a ⅜" X 4" dowel in the vertical hole in the center body section to support the puppet on the chassis. Drill and counter bore the arms for #6 X ¾" round head brass screws. Use a washer between each arm



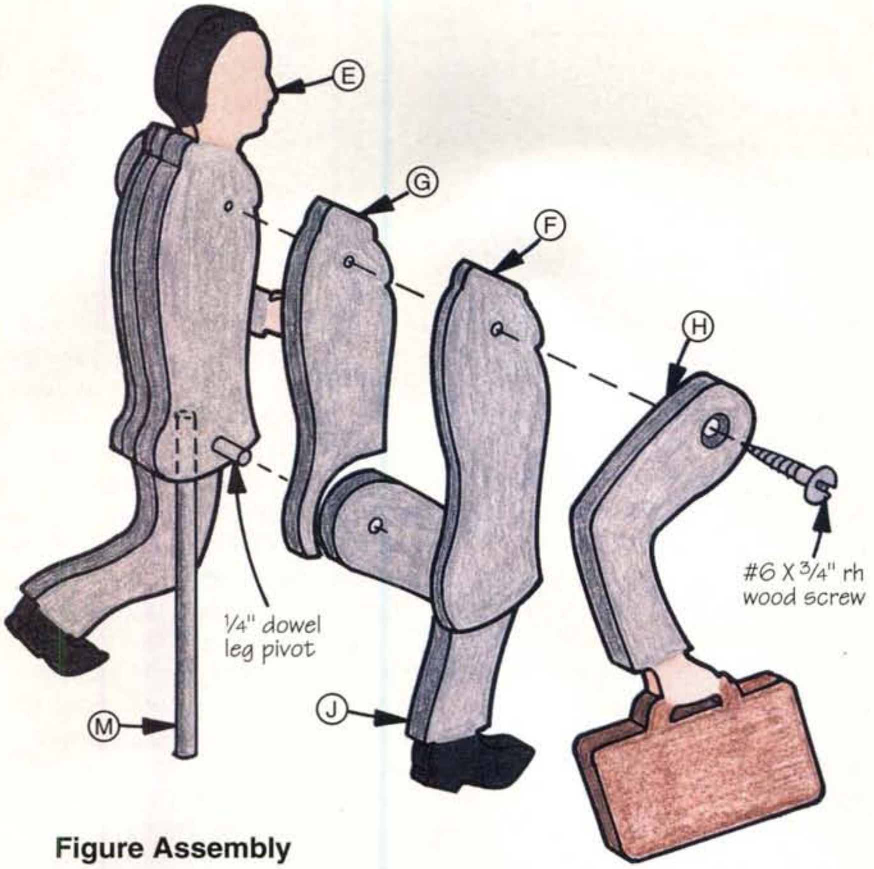
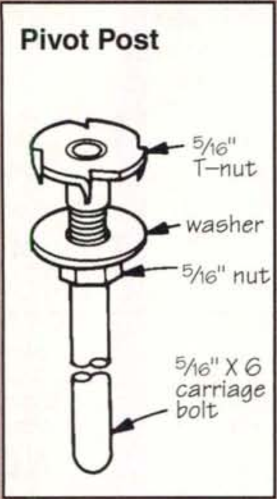
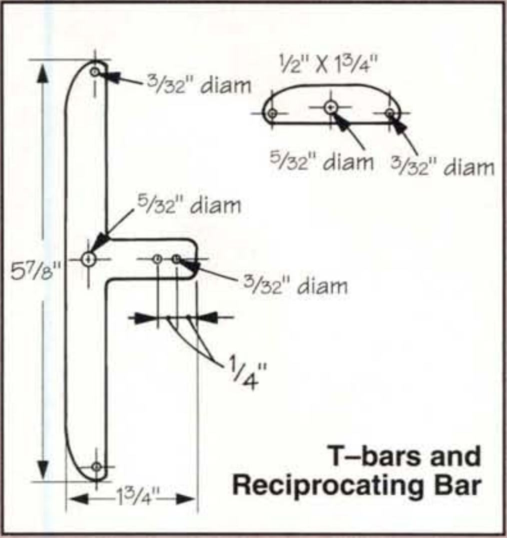
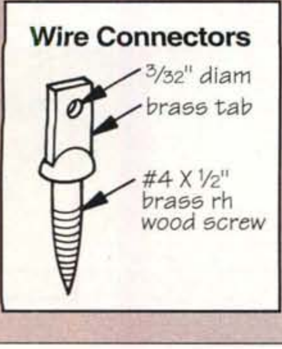


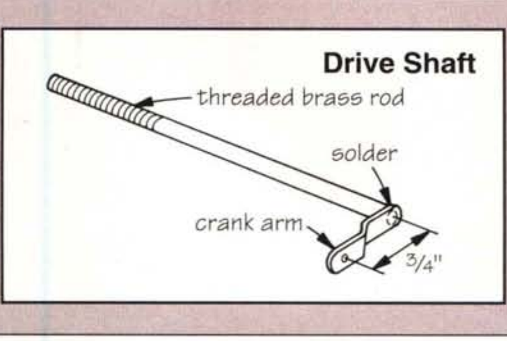
Figure Assembly


Pivot Post



T-bars and Reciprocating Bar

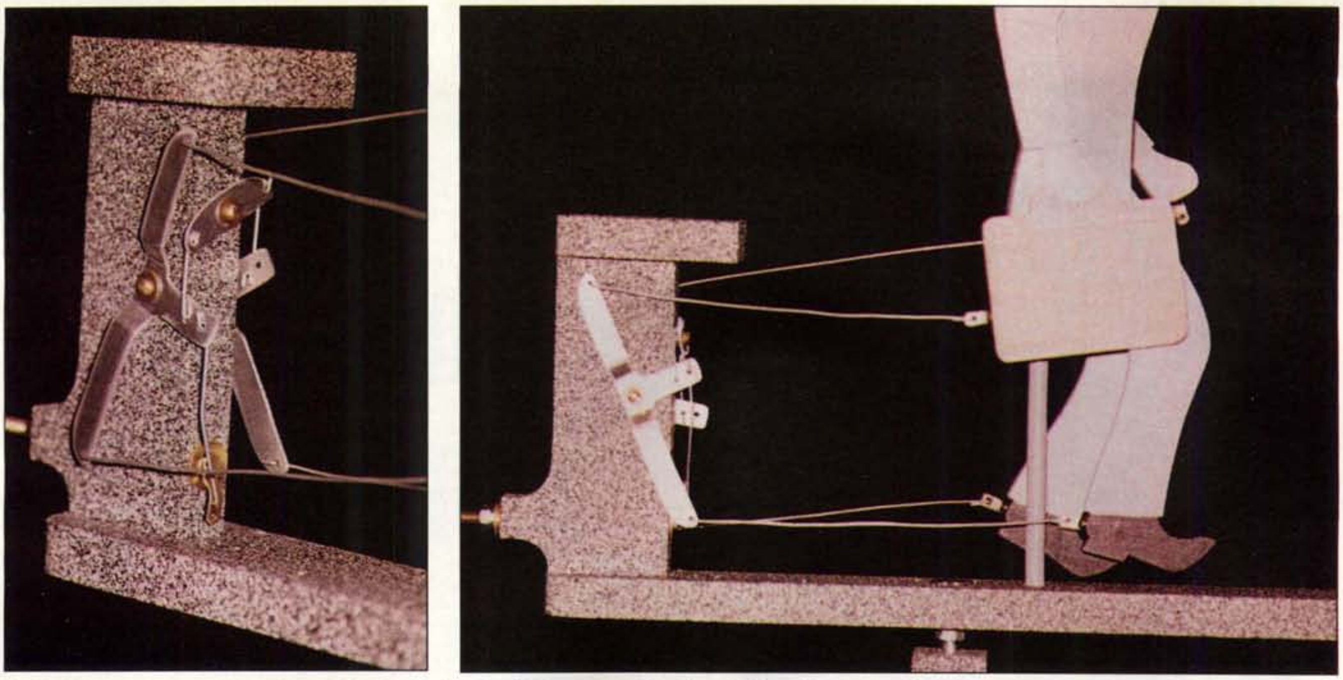

Wire Connectors


Drive Shaft

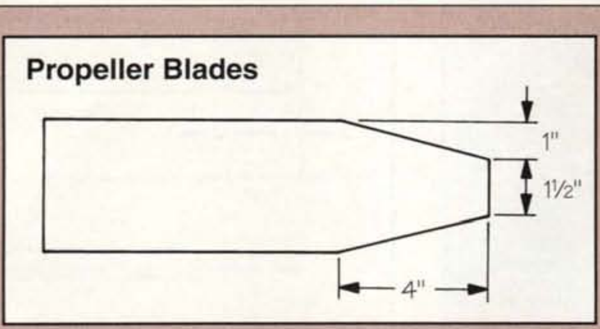
and the body and one under the head of each screw. The arms should swing freely on the mounting screws when they're attached. Conceal the screw heads with wooden plugs. Paint the puppet to resemble a *business* man carrying an attaché case. Screw the connectors, shown at lower left, into the arms and legs for the activating wires that will be added later. Secure the completed puppet to the lower chassis support on the support post (M). Mount the puppet high enough on the column so the legs clear the lower chassis support as they swing. Use a screw through the edge of the lower chassis support to retain the post.

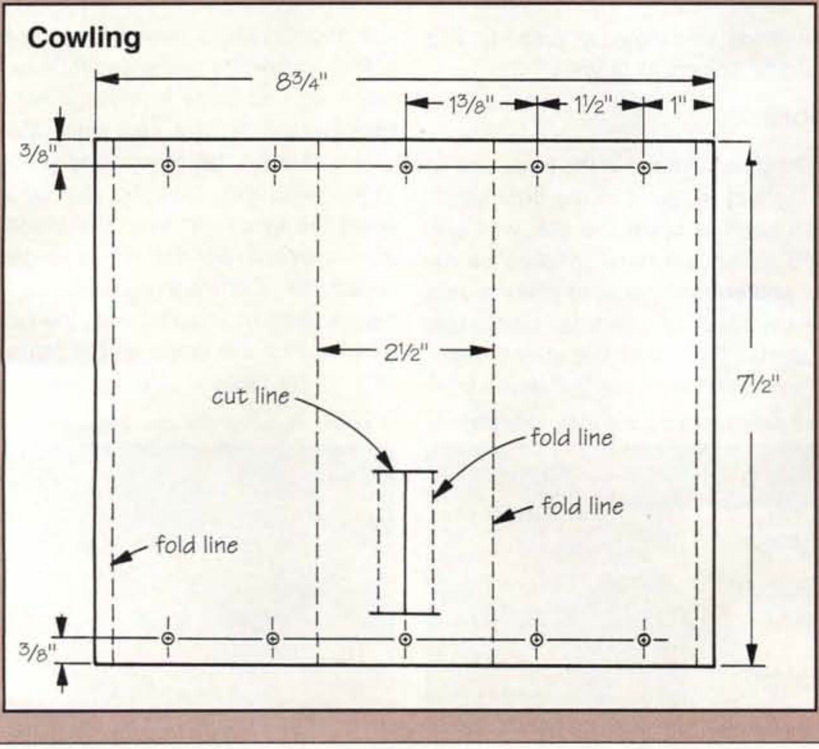
The components of the mechanical system required to activate Dashing Dan are shown at left. Cut two T–bars and a reciprocating bar from a piece of .064" x 4" x 10" aluminum. Bend the arms of the T–bars to prevent them from binding against the drive shaft mounting block (see photo at right). Fasten the T–bars and the reciprocating bar to the drive shaft mounting block (C) with #6 X 1/2" round head brass wood screws in the previously drilled pilot holes. Use washers on both sides of these parts to reduce friction. Tighten the screws just enough to prevent the bars from wobbling, but without restricting their free and easy movement on the shank of the pivot screws.

The drive shaft is a 7/32" brass rod with extruded 1/4"–20 threads on one end. It can be made from half of a brass float arm. Solder a brass crank arm, made from a strip of brass .064" X 1/4" X 1" on the unthreaded end. Make an offset bend in the crank arm so it won't rub against the drive shaft mounting block as it turns. The brass and aluminum flat material is available at craft and hobby shops. The brass float arm can be found in the plumbing department of most hardware stores. Link the components together with short pieces of 14 gauge galvanized wire. The wire rods connect the upper ends of the T–bars with the connectors on Dan's arms. Wire rods also link the lower end of the T–bars with the connectors behind his heels. Use a Z bend at each end of the wire to secure it in the holes in the metal fittings. Adjust the length of the wire rods by trial and error until the puppet's legs achieve the desired



Link the components together with short pieces of 14 gauge galvanized wire. The wire rods connect the upper ends of the T-bars with the connectors on Dan's arms. Wire rods also link the lower end of the T-bars with the connectors behind his heels.





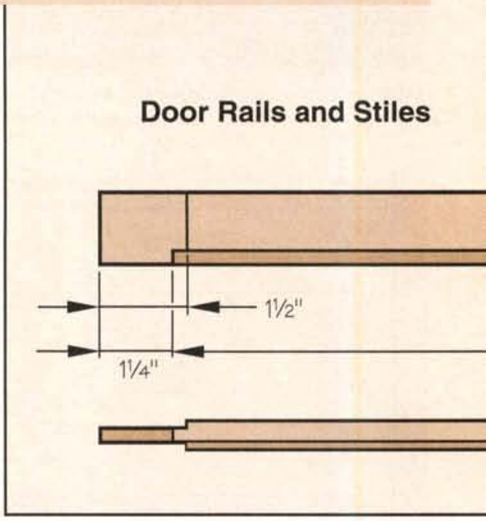
range of motion as you rotate the drive shaft. When you're happy with the action add the cowling to conceal the mechanical system. The dimensions and layout for the cowling are shown below. Make the cowling from a piece of aluminum flashing. Use #4 X ⅜" hex head aluminum screws to secure the cowling to the chassis.

The propeller to drive this whirligig has six 12" blades connected to the propeller hub (K). Make six evenly spaced kerfs at a 45 degree angle with the edge of the hub around its circumference. Orient the kerfs ¼" wide X ¾" deep to hold the propeller blades at an angle that produces a clockwise rotation of the propeller. Cut out the blades to the shape shown at left. Secure the blades in the kerfs with waterproof glue and screws.

Paint the propeller before securing it to the drive shaft. Place two washers on the threaded end of the drive shaft followed with a ¼"–20 locknut. Don't tighten the locknut too tight—the drive shaft won't turn freely. Place another washer on the drive shaft; then the propeller, another washer and the second locknut. Tighten the locknuts behind and in front of the propeller hub to secure the propeller on the shaft. Place the completed whirligig in a breezy location and watch Dan dash off to catch his train. PW

A Popular Woodworking Project

Compact Disc Storage Case



by Jeff Greef

Because of their small size, compact discs need a special case. This one holds a large number behind glass where dust can't get at them. The case is sectional so that later on, if you get more than the ninety–six CDs the two sections can hold, you can build more and stack them. The sections aren't fastened together—the top fits over dowels placed in the bottom to hold the two together without glue.

The doors open downward until they're horizontal, then stop in that position and act as a shelf to hold the CDs you've taken out. Hinge pins on the doors cause the door bottom to contact the case back, stopping it at the right spot.

To get the widths in the Cutting List, edge–glue boards together. Plane your stock to the right thicknesses or the dimensions won't line up properly. Rip all widths and cut all lengths.

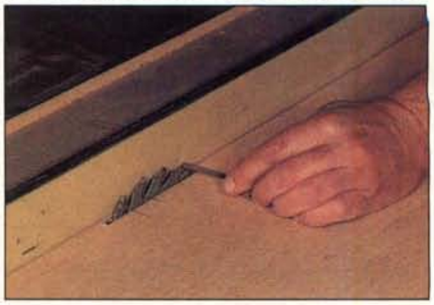
Jeff Greef *works wood and writes about it in Santa Cruz, California.*

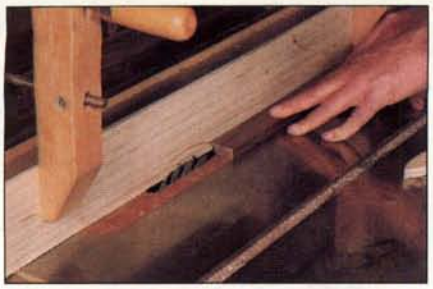
Doors

Set up a ¼" dado in the table saw to cut the slot mortises in the door stiles. You'll need to cover the saw with plywood as shown here (photos below right and on next page) to make a safe cut—the dado can pull small pieces into the throat. To install the cover sheet, set and lock the fence 1/16" away from the dado blade. Lower the blade and clamp a plywood piece securely to the table with its edge firmly against the fence. Turn on the saw and raise it slowly through the plywood to a height of just over ¾". Turn the saw off and reset the fence ⅛" from the blade as shown below. Set the blade height to exactly ¾". Confim the settings by running a piece of scrap through the setup. Then clamp the scrap to the fence 1" behind the highest point of cut. It acts

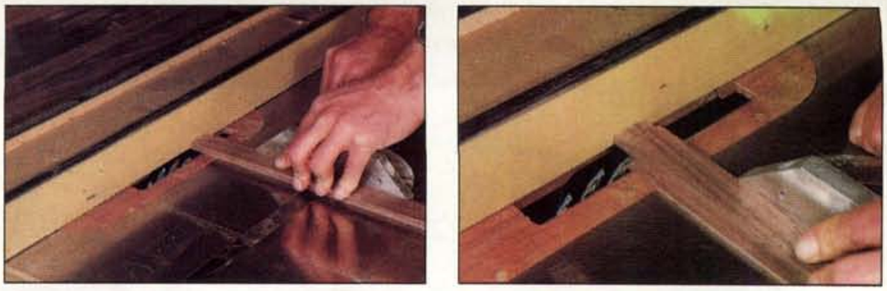
Don't even try to cut the slots this way!

A cover sheet on the saw makes it safer.

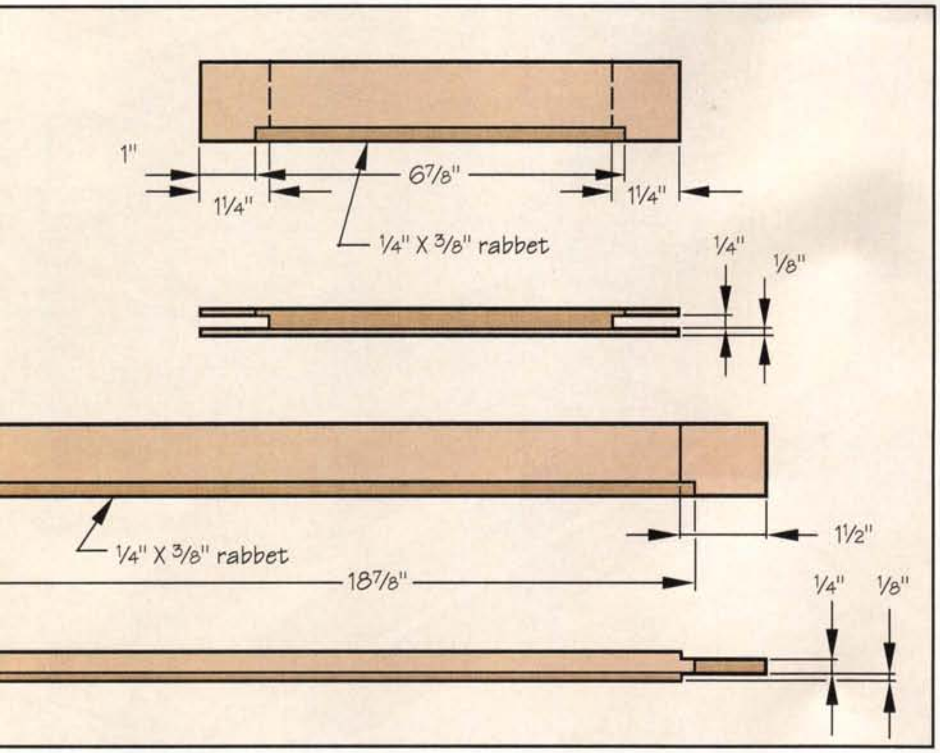


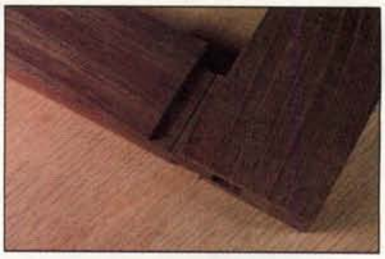


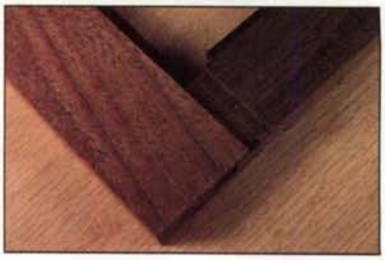
Set the auxiliary fence right against the dado to cut the ¼" wide rabbet. I should be holding a pushstick here!



Cut tenons on the rail ends with the dado and table saw miter gauge to 90°. Make the tenons slightly large. Try to fit them in a mortise—then raise the saw blade a hair, and cut and fit the tenon again.







as a stop in cutting the slot mortises—see the photo below right.

Cut the slots by pushing the stiles against the fence and into the dado until they hit the stop (next photo). Keep your fingers as far to the rear as possible and carefully slide the piece straight back. Cut a test piece to be sure the mortise is centered along the ½" thickness, to confirm height and length, and for practice.

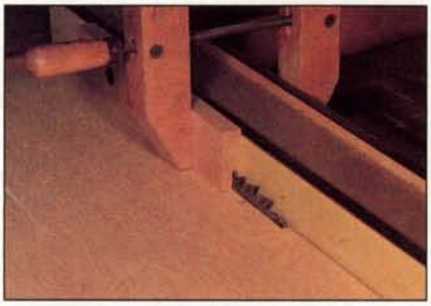
Cut the glass rabbet along the inside edge of the door frame parts with the same dado setup, but remove the stop and cover sheet. Clamp a long piece of flat scrap to the fence as an auxiliary fence as shown in the first photo above, and set it right alongside the dado to cut a ¼" wide rabbet. Set the blade height to ⅜" and cut the rabbet on all stiles and rails. Use push sticks on the small pieces!

Cut the tenons on the rail ends using the dado. Set the fence ½" from the outside of the blade and place the table saw miter fence at 90°. The blade must be ⅛" high, but set it below that first and cut the end of one rail on both sides (second photo above). Butt the rail end against the fence and make a cut, carefully retract, then move the rail ¼" away from the fence and cut once again to complete one face of the tenon. After cutting two faces, try to fit the tenon in a mortise. It will be too large, so raise the blade a hair and cut and fit again until the fit is right.

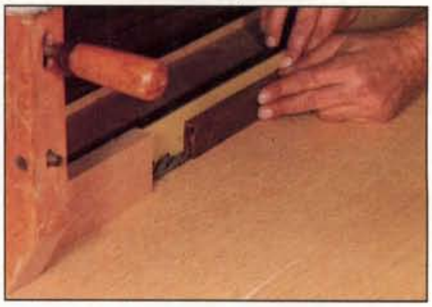
Note that the tenon won't go all the way to the bottom of the mortise because the rabbet lip on the stile is in the way. Make the tenon face on the outside of the rail ¾" long by setting the fence ¾" from the outside of the blade and taking one more cut on the rail end (top right photo). This cut relieves the rail just enough to make way for the rabbet lip on the stiles. The two photos above show the finished joint.

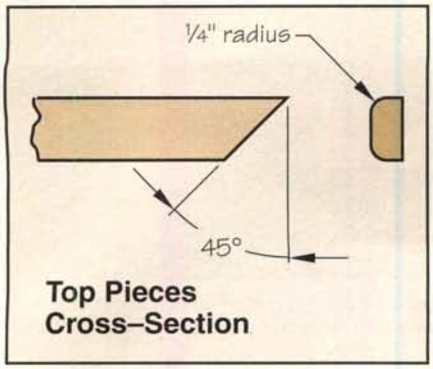
Glue up the doors as shown in the photo on the bottom of the next page. Pull the stiles onto the rails with bar or

The clamped piece accurately end–stops the cutting of the mortise slot.



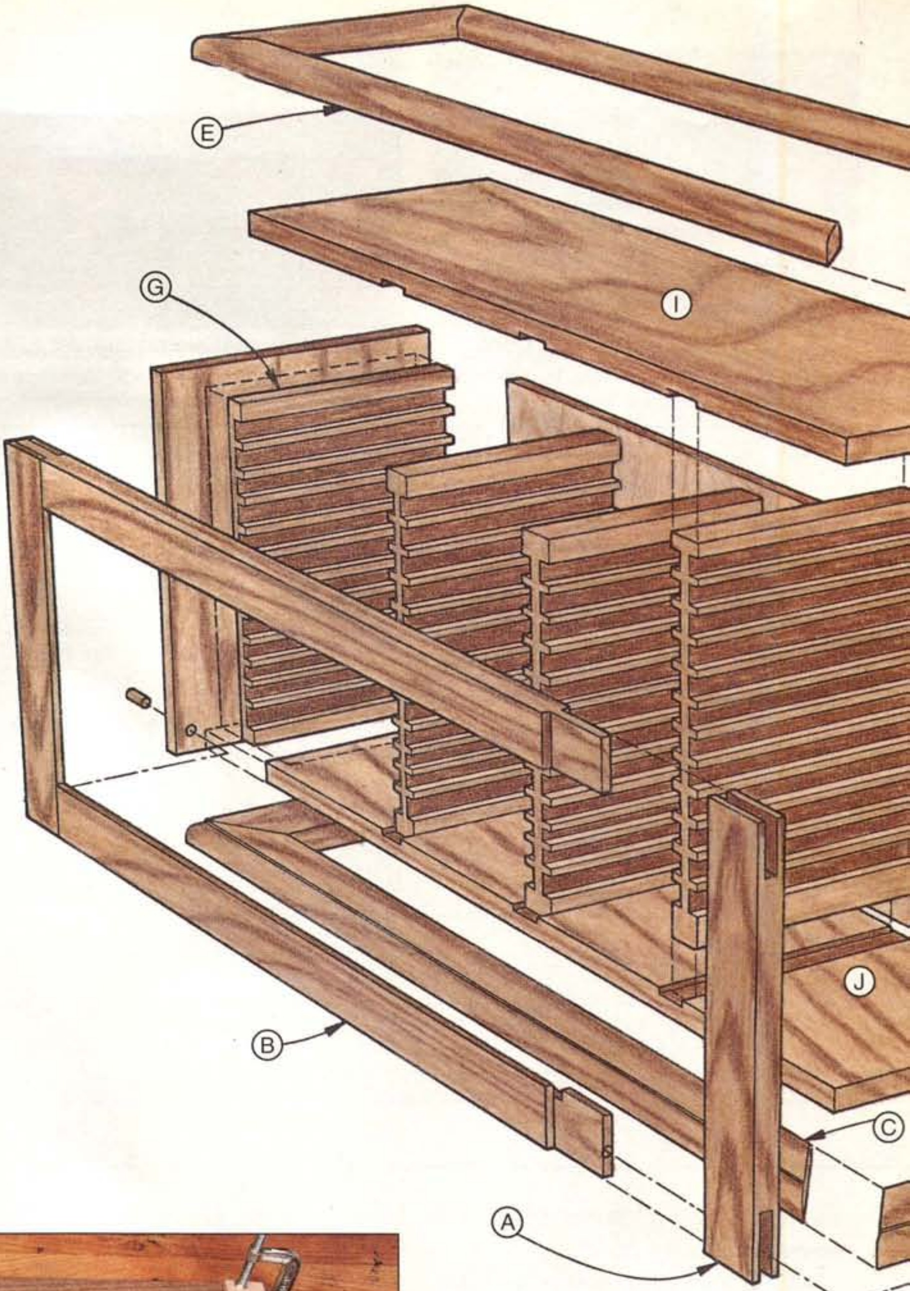
Retract the piece cleanly and straight back after it hits the stop.





Top Pieces Cross–Section

Use a dowel jig to bore the holes for the hinge pins.



pipe clamps. Be sure the rails are flush with the ends of the stiles, and check for square. To squeeze the mortise walls onto the tenons, C–clamp the joints with scrap blocks (photo below); then remove the bar clamps.

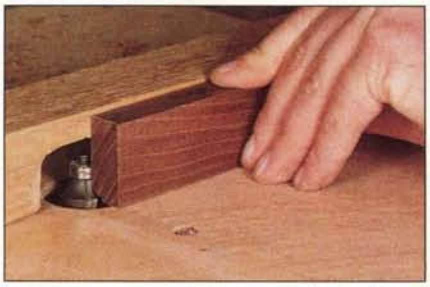
When the doors are dry and out of clamps, bore 1/4" diameter holes along the stile edges, 1/2" from the bottom and 3/8" deep. In order for the door to stop level, the holes must be centered on the stile with their centers exactly 1/2" from the bottom. Use a dowel jig to locate them (photo above left).

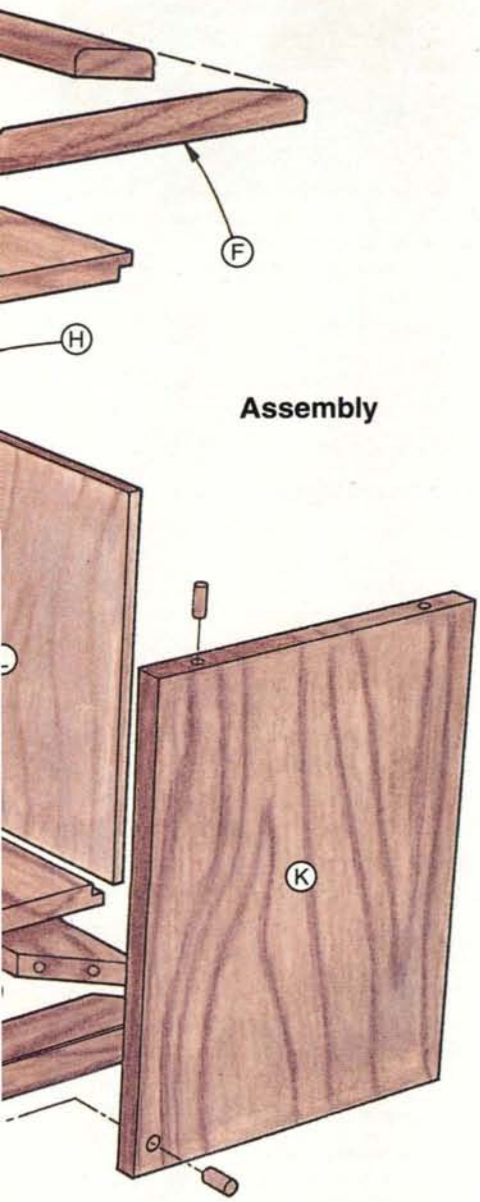
Cut a 1/4" radius roundover on the inside lower edge of the doors as shown in the photo to the right. This relief cut allows the inside corner of the door to pass by the lower plate as the door opens.

While you have the quarter–round bit set up, cut the detail on the four base pieces (B and C) and the four top pieces (E and F). Round over the two upper edges on all top pieces with the

The 1/4" roundover on the lower door edge lets the door clear the lower plate.

Use the same quarter round bit to detail all eight top and base pieces.

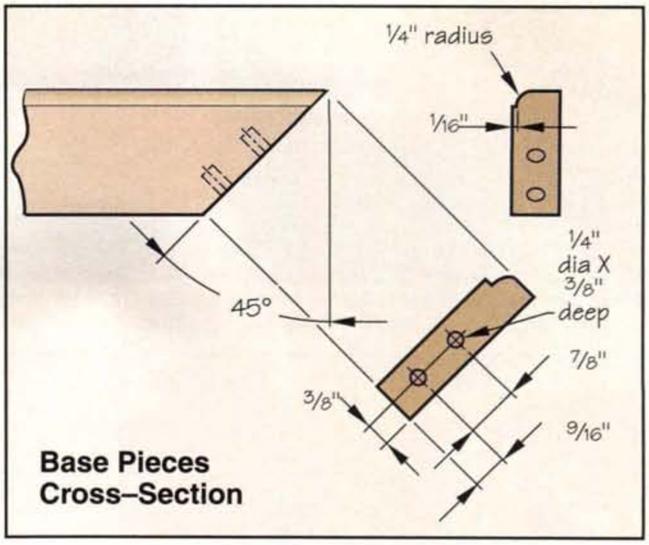




Assembly

same setup used for the doors. For the base pieces, however, raise the bit 1⁄16" to make a small lip, and run the pieces through on edge (photo to the left).

Tape spacers to the outer shelf pieces so you can dado them with the middle ones.



Base Pieces Cross–Section

CD Storage Case Cutting List					
Finished Size					
Qty	Part	T	W	L	Piece
2	A	½"	1½"	8⅞"	door stiles
2	B	½"	1¼"	21⅜"	door rails
2	C	¾"	2"	23½"	base moulding
2	D	¾"	2"	7⅞"	base moulding
2	E	½"	1"	22½"	top moulding
2	F	½"	1"	6⅞"	top moulding
4	G	½"	5½"	8"	shelf supports
6	H	¾"	5½"	8¼"	shelf supports
2	I	½"	6"	21½"	top plates
2	J	½"	6¼"	21½"	bottom plates
4	K	½"	6⅞"	9"	sides
2	L	¼"	8½"	21½"	plywood backs

Cases

Dado–cut the slots for the compact disks in the outer and middle shelf supports (see the Cross–Section Figure on the next page), but before you set up, make four 1⁄8" X 1⁄2" X 5" spacers. Tape the spacers onto the ends of the outer supports (G) (first photo below). This effectively makes the distance from the bottom of these supports to the slots the same as on the middle shelf supports (H). The middle supports are longer than the outer ones by 1⁄8" both top and bottom where they fit into dadoes. By taping the spacers onto the outer supports, you can use the same setups for cutting the compact disk slots on both the outer shelf and middle shelf supports.

Set up the dado cutter 7⁄16" wide. I have yet to see a plastic compact disk box that is thicker than this—but check your collection just in case. Set the height of the blade to 1⁄4". To cut the first groove, locate the fence 1⁄2" from the inside of the dado. Cut dadoes on all shelf pieces with this setup (center photo below), always placing the bottom of each shelf piece against the fence. Cut dadoes on both sides of the middle supports (H), but on one side only of the outer supports (G).

Now move the fence 5⁄8" away from the blade, and again cut dadoes, always placing the bottom of each piece against the fence. After each set of cuts, move the fence another 5⁄8" away for the next, and continue until you've made 12 dadoes on each side of the shelf supports (photo below). If your fence has a measuring gauge, use it to add the 5⁄8" each time. Keep the end of the shelf piece firmly against the

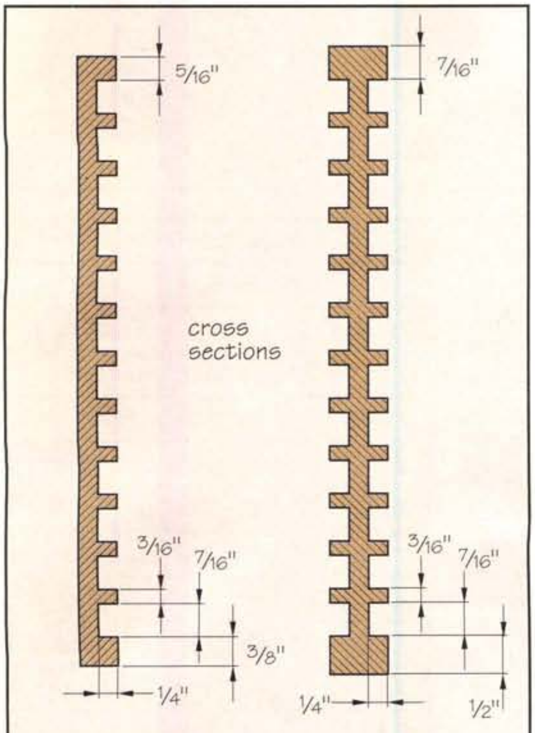
Cut the first groove on all pieces with the fence 1⁄2" from the blade.

After each set of cuts, move the fence another 5⁄8" away for the next.

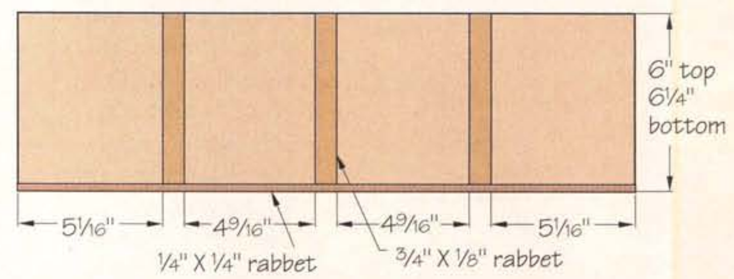
Make the first cut in the center of the top and bottom; then cut the outer dadoes.

Use the miter fence as a guide and the rip fence to locate the cuts 4 9/16" apart.

A ¼" x ¼" rabbet along the rear inside edges will hold the back.



Outer and Middle Shelf Pieces



Top and Bottom Pieces Shelf Dadoes

fence during the cut, and never pass your hand over the blade.

Set up to cut the dadoes in the top and bottom plates (I and J) to hold the middle shelf pieces. Make them ¾" wide, with a ⅛" depth of cut, and locate them so there's 4 9/16" between each shelf piece. Make the first cut in the center of each top and bottom plate (top left photo) using the miter fence as a guide and the rip fence to locate the cut. Then move the rip fence in until the next cut will be 4 9/16" from the center dado. Use this setting to cut both outer dadoes (center photo above). The distance from the outer dado to the end of the piece is ½" greater than 4 3/16" because no dado is cut for the outer shelf pieces.

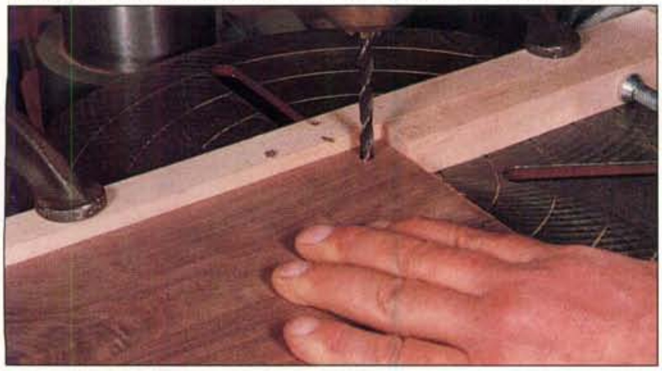
Cut a ¼" x ¼" rabbet along the rear inside edge of the top and bottom pieces using the dado set up as you've had it for cutting the shelf dadoes. Set the fence ¼" from the inside of the blade, and the ¼" high. Make the cut as shown in the photo above right.

Bore ¼" holes in the side pieces for the door hinge pins (photo below left). Locate them ⅜" from the front edge of each piece with a fence clamped on the drill press table. Locate the holes at 9/16" from the bottom of each piece with a stop block clamped to the fence as shown in the photo. Move the stop block to the other side of the bit when boring ⅜" deep holes for opposing side pieces. Confirm hole locations on scrap before you cut.

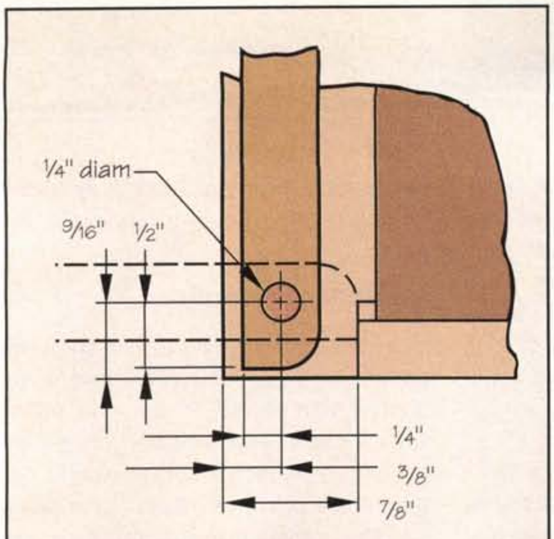
Bore holes in the top and bottom of the sides for the dowels that align the two cases together—drill only where cases join. Center them along the thickness of the pieces, and locate them 1" from the front and rear edges.

Glue the outer shelf supports to the sides as shown in the photo below. Locate them ½" from the bottom of the

Bore ¼" holes in the side pieces for the door hinge pins—locate them carefully using the measurements given in the text above.



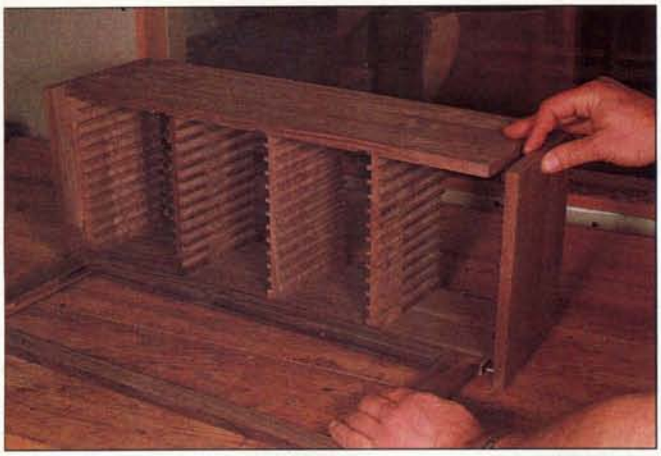
Glue the outer shelf pieces to the sides, locating them ½" from the bottom of the sides and ¼" in from the rear.



Top Rabbets and Dadoes

sides and ¼" in from the rear. There should be ½" both top and bottom from the end of each shelf to the end of each side. This ½" forms a rabbet in which the top and bottom plates rest. The ¼" at the rear forms the rabbet into which the rear plywood back fits. Don't forget that the outer shelf pieces have bottoms and tops—take care to locate the bottoms at the bottom of the sides, where the hinge pin holes are drilled.

Assembly



Hacksaw ¾" long hinge pins out of ¼" bolts. Place them in the holes and dry–assemble the case as shown in the photo to the left. Be sure that the bottom surface of the middle shelf supports face down.

Locate a bar clamp across the case from side to side to hold the assembly together, and test the opening of the door. Its rounded bottom edge should just miss the front edge of the bottom plate as it opens, and the front edge of the door bottom should contact the front edge of the bottom plate as the door reaches horizontal. Make adjustments, then glue and clamp again.

Once the door opens to horizontal, drill for screws through the sides.

When the case is clamped and door opens level, drill through the sides into the top and bottom for screws.

Again open and close the door—you can slide the bottom plate forward or rearward slightly to adjust its operation. When it's to your liking, drill for screws through the sides into the top and bottom. Sink the screws, remove clamps, and plug the holes with the same wood.

The middle shelf pieces should be secure if their dadoes are snug; if not, secure them with ½" finish nails from the outside of the top and bottom. Center the nails on the shelf pieces.

Cut out 8½" X 21½" pieces of ¼" plywood for the case backs. Place these in the rabbets and secure them with ½" finish nails.

Miter the base pieces so their final lengths are 7⅞" and 23½". Use a dowel jig to locate dowels to join these pieces. Set it up like the one in the photo in the bottom left corner of this page. Glue up the case frame, and when dry, screw it to the bottom of one of the two cases. Center the base on the case so that it extends beyond the outside of the case ½" all the way around. Note that the base overlaps the bottom plate by only ¼" or so. Angle the screws you sink here so they hit solid wood.

Miter the top pieces at lengths that will flush them to the outer perimeter of the case, and glue and nail them to the top of the other case.

Choose a latch for the doors which is small and doesn't have a lot of resistance to closing. Finish the case before you put the glass in. On this one I used Watco oil.

Measure the hole in the doors for the glass, and have the glass cut to 1/16" less on each dimension so it fits nicely. Use "single strength" window glass, which is 1/16" thick. Make 3/16" X 5/16" wooden stops to hold it in; miter them at the corners so they fit tightly for a clean look. Predrill for the ½" finish nails that hold them with a very skinny bit just under the nail thickness. *If you* don't predrill, the stops will probably split. Place the glass, locate the stops, and nail them down as shown in the photo to the left.

Have the glass cut 1/16" smaller each way than the opening.

Glue dowel pegs in the holes you drilled earlier in the top of the bottom case so they protrude about ¼". The top case fits on them and shouldn't be glued—when you buy that one compact disk the case can't hold, you'll want to build another or two and stack them together. PW

HVLP Spray Painting

by Ian T. Haldimann

Your latest shop project is nearly complete. And, as much as you hate to pat yourself on the back, this unique family–room coffee table is a shining example of your best work. But, there's one more hurdle to cross—this masterpiece is supposed to shine through a honey oak stain and acrylic finish that will stand up to any abuse the kids can deliver. Getting a knockout finish that looks as professional as the rest of your work could be a challenge. Bubbles, brush strokes, drips and dropped hairs just won't do—you've got a reputation to uphold. You need a perfectly smooth, perfectly rich finish.

Spray application is the answer, but your last experience with a sprayer is referred to by the whole family as "the porch incident." The automotive type sprayer you used took a simple patio chair project one step further and spread a thin speckled layer of bright yellow paint on the screens, the house, the window and your black lab snoozing in the flower bed. The horror has been etched in your mind forever.

A New Beginning

What better rehabilitative therapy is there than a positive experience with a *user–friendly* sprayer—one that won't intimidate or embarrass you or ruin an up–until–now perfect job?

It's possible. The solution lies in the volume of air (more of it) and the amount of air pressure (less of it) during the application procedure.

For projects like your coffee table, manufacturers have developed and tested what is known as HVLP (high volume, low pressure) sprayers. They don't require a compressor, or a spare room to sacrifice to runaway paint mist. To top it all off, you'll do an even better job in less time.

Affordable solutions

Today's high–quality, compact units are lightweight (about 15 pounds) and portable (one handed carry). When you're spraying, you only hold the gun/canister—about five pounds filled—connected to a turbine motor by a 15–foot heavy–duty hose.

An HVLP generates a high volume of air, typically about 54 cfm, at 4 psi pressure. It produces a fine, finish–quality spray without the clouds of overspray and waste associated with compressor–powered automotive–type guns. You'll also enjoy much greater control than conventional airless systems, which are designed to apply lots of paint over large areas. You can put exactly the right amount of varnish, stain, lacquer or paint exactly where you want it, and you'll use only about half as much product to complete the job.

Beginner Friendly

In case you're new to the spraying game, you'll probably feel more comfortable with an HVLP than you would with a compressor based model or even a conventional airless gun. Many beginners are intimidated by airless systems because the material comes out too fast for someone who wants to do their best work.

The canister on an HVLP holds a quart of finish material which is good for about 15 minutes of continuous spraying. That's comparable to a half gallon of material under compressor driven systems. HVLP sprayers lay an impressive 86% of the material on the project, compared to 35% to 40% with conventional equipment. With reduced pressure and larger droplets, you have less floating material in the air. Murphy dictates drifting paint toward surfaces you would rather not refinish.

Because it has no fiendish urge to speckle everything in sight, an HVLP is a particularly useful tool for finishing projects *in confined* spaces. Few of us have handy warehouses for work that might get messy.

Thick To Thin

In spite of the HVLP's comfortable application pace, it's wise to conduct tests before starting on the piece to be finished. This is especially true when material thickness is in question.

Manufacturers offer, as accessories, a selection of needles and nozzles for differing viscosities. Some thinning–no more than 20%–might still be needed for certain finish materials, like heavy varnishes.

To make thinning easier, some manufacturers include viscosity sticks so you can test the thickness of the finish before you begin spraying. The experts say the best material composition is when the liquid drops off the trough–shaped metal stick at one drop per second.

When you choose thinning products, follow the printed recommendations from the product manufacturers. Remember to leave room in the canister for thinning solvents if the thickness of the finish material is in question.

And, when you set the canister down for refilling or thinning, be careful not to spill finish material into the air hose. Some units include a built–in canister caddy to hold the cup upright for transporting or filling.

Versatile Helper

An HVLP is ideal for woodworking, cabinetry and furniture applications—wherever a fine finish is needed. It sprays a variety of materials, including acrylics, stains, enamels, lacquers, latex paints and primers.

Top–quality HVLP models have convenient controls to adjust air flow for pressure and liquid volumes to adjust finish thickness. Quick–release, secure–seal canister lids let you add your finish product quickly and easily. Some models feature a durable aluminum canister cup like the automotive–type sprayers. For most woodworkers, an HVLP will satisfy every spraying need.

Sounds Like A Vacuum

Although the HVLP is ideal for woodworkers, other do–it–your–selfers are likely to be attracted to the sprayers because of their compact, light–weight design.

As with other power tools, the performance and durability of an HVLP depends extensively on proper cleaning and maintenance. Follow the manufacturers recommendations in these areas. For safety and convenience, look for a model that doesn't require operating the gun to rinse.

Hitting Your Target For the Finest Finish

Here are some HVLP spraying tips to produce near perfect jobs in your shop:

Fresh Air—The drawback to finish work in confined spaces is deteriorated air quality. The smaller and tighter the space, the greater the likelihood of nausea, fainting and/or poisoning. Stains, varnishes, acrylics and solvents all can be harmful if inhaled. Always be sure there's plenty of ventilation in the room before you start work. Wear a respirator or filter mask if you believe you might inhale dangerous fumes.

Cleanliness—Make sure there's no dust or dirt on the surfaces to be finished.

Hazards—Avoid open flames, hot objects and sparks. Read the labels on all the products. Some compounds can react with aluminum canister cups.

Testing—Keep plenty of cardboard or other scrap material handy for initial test spraying. Test spray every time you change paint cans or adjust material thickness.

Thinning and Thickening—When adjusting viscosity, be sure to deplete the old mixture in the canister and the gun before testing your new thickness level. Mixing the old with the new can result in finishes that aren't uniform.

Patterns—Choose the direction you want to apply the paint and adjust the nozzle. Pattern options generally available are horizontal, vertical, or round.

Distance—Optimum spraying distance is 5 to 10 inches from the surface you're finishing, but back off a bit in the beginning to make sure you're not overdoing it.

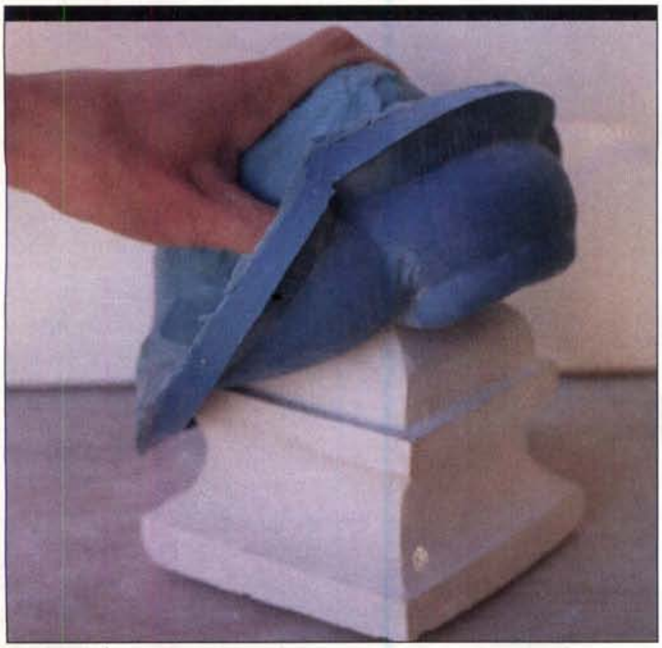
Precision—When finishing woodwork or portions of a project, use a simple shield to protect adjacent surfaces. HVLP's are great for up–close, detail finishing, but don't over estimate your capabilities when it comes to precision coating.

Movement—Move the gun slowly and steadily, be careful to keep the spray perpendicular to the surface you're finishing. Overlap strokes by 40% to 50%. Make sure your hand is already in motion before you pull the spray trigger.

Air filters—Clean the air filter in the sprayer after each use for smooth operation.

News and Notes

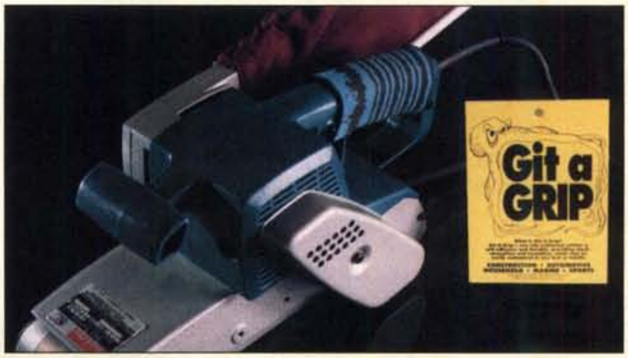
New products to announce? Send a press release and a color photograph to the Editor, Popular Woodworking, 1041 Shary Circle, Concord, CA 94518, and we'll consider them for News and Notes.



Mastermold™ 12–3 is a flexible brush–on mold–making paste. A two part polyurethane system, it reproduces the finest details for the reproduction of sculpture, mouldings, curved furniture legs, cornices and other detailed work. Applied in one coat, the bubble–free mold is ready for repeated use in about six hours. Because of its high–elasticity and tear strength, it's easily peeled from intricate and undercut shapes. Abatron, Inc., 33 Center Drive, Gilberts, IL 60136. Tel. (708) 426-2200.

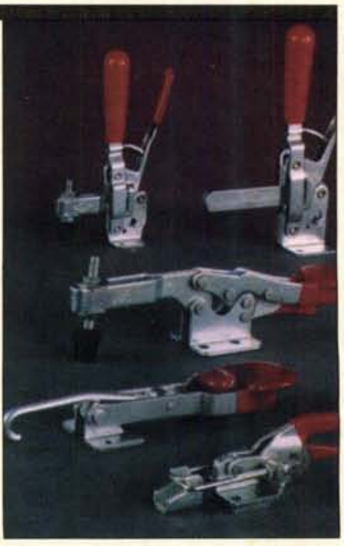
The Slide Shooter™ is an old tool with a new twist—marketing and a guarantee. It's a nail driver for hard to reach places where you can't swing a hammer. The two larger models drive 5d to 16d common or duplex nails, and the smaller one is for finish, small box, tacks or chamfer nails. To use, insert a nail in the guide tube, place the end of the tube against the work and thrust the weighted handle forward. Available at selected Home Depot and Ace Hardware stores, or from Benda Industries, 8 Scander Court, Pleasant Hill, CA 94523. **Tel. (510) 685-9189**

Tired of having your hand continue to vibrate long after turning off the tool? Git–A–Grip is a non–slip, cushioned pad that attaches to any tool handle to provide shock absorption and insulation to reduce hand fatigue. Sold in a variety of colors and textures. Git–A–Grip, 12504-C East Pacific Circle, Aurora, CO 80014. Tel. (303) 755-7950.

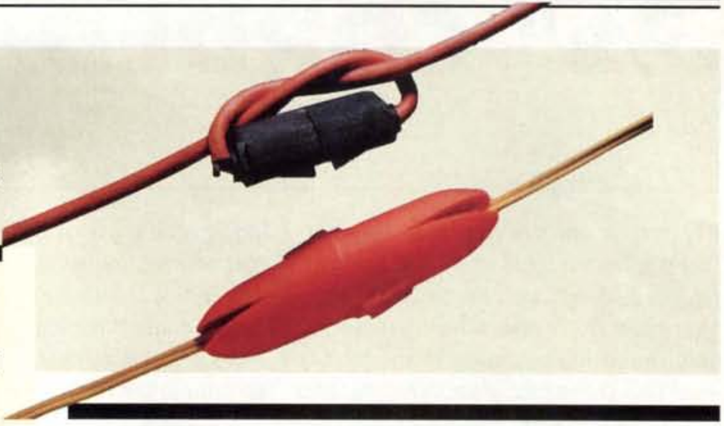


If you love power carving but are sick of the mess, now there's a solution. Attach Vac–U–Shield® onto your Fordom® or other cable–driven carving tool. Vac–U–Shield features a clear shield that protects your eyes and face as it and sucks away dust and chips as they're ground off the wood. The swivel–mounted vacuum hose attaches to a standard vacuum unit. P.S.D.G, P.O. Box 39060, Holmesburg Station, Philadelphia, PA 19136.

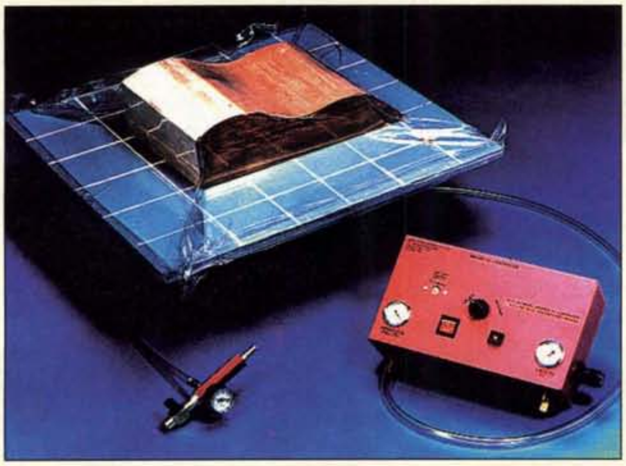
De–Sta–Co has introduced its newest line of workholding clamps—Toggle–Lock Plus™. They have modified several of their most popular clamps with a locking release lever for improved safety. The locking lever insures that the over–center conditio is maintained. De–Sta–Co, P.O. Box 2800, Troy, MI 48007. Tel. (313) 589-2008.



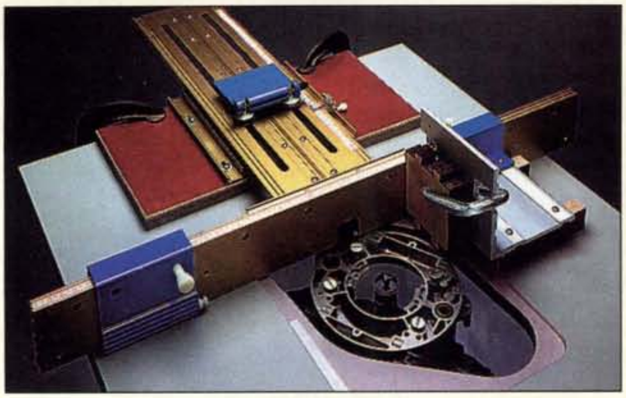
Eliminate the loss of power as you move around the shop with Not–A–Knot. Easily attached, its torpedo shape prevents hooking or snagging on bench corners, ladders and other obstructions in the shop. Not–A–Knot, P.O. Box 475, Pottstown, PA 19464. Tel. (215) 323-1881.



Quality VAKuum™ Products announces the availability of VAKuum Klamping™ and VAKuum Bag Veneering Systems™. The VAK Pump™ operates with either a ½ or 1 H.P. compressor to produce up to 1800 lbs/sq. ft. of uniform clamping force on the workpiece. Quality VAKuum Products, Inc., 32 Longmeadow Road, Lincoln, MA 01773. Tel. (800) 547-5484.



INCRA JIG PRO combines all the performance and accuracy of the original with increased range and many new features. The 16" sliding scale is top mounted for better visibility and the new Flipsight™ hairline cursor rides on top of the scale, or easily flips back out of the way. The new INCRA PRO 28" Fence System has all the features of the the original and is designed to with the INCRA JIG PRO. Taylor Design Group, 13628 Neutron Road, Dallas, TX 75244. Tel. (214) 243-7943.



Paktek, maker of the Tool Pak™—a backpack for tools—now makes the Tool Pak brand Fanny Pak for tools. It features a fold–out panel and three internal compartments, all designed to hold a variety of tools in a way that's convenient and organized. Paktek 7307 82nd St Ct SW, Tacoma, WA 98498. Tel. (800) 258-8458.

Tired of dumping your tool box on the bench or digging through pockets to find that elusive tool? Tool Keeper snaps onto the top of most 3, 5 and 6 gallon buckets and organizes over 80 different tools. Ramparts, Inc., 53 Belcher Road, Blairstown, NJ 07825. Tel. (800) 342-7267.

Tool Talk *by Sanford Wilk*

3/8" CORDED DRILLS:

A MULTI–USE TOOL

I remember the first tool I bought, and it wasn't a table saw. It was a simple corded drill and I'll bet your shop has more than one. The question is; how much life remains in them? My shop has some pretty ancient drills, and though they still run well, I miss the nifty electronic capabilities that modern machines offer. Most of my antique drills aren't double–insulated so I'm just waiting to get a jolt someday.

Most people overlook a drill's true potential which is far beyond cutting holes in stock. With a little Yankee ingenuity and a few accessories, you can turn a corded drill into a mini–shop. An instant drum or disc sander can come to your project instead of you trying to maneuver a large project around the shop. You can buy attachments that can turn your drill into a portable doweling jig, drill press or a flexible–shaft tool that offers a myriad of options by itself. The combination of motor and drill chuck gives this simple power tool far more capabilities than many craft minded people give it credit for.

***Sanford Wilk**, a builder and organic architect in Boston, Massachusetts, heads a team of craftsmen who evaluate tools under actual working conditions.*

ANATOMY OF A CORDED DRILL

Connecting the motor with the chuck is a series of gears that control speed and torque. The trigger decides when and how much juice goes to the motor, but the gearing is the true measure of a unit's torque capacity. Since spade bits range up to about 1½" in diameter, torque is an important factor in drill choice. As a rule, the more stages of gearing a drill offers, the more tenacious a cutter it will be.

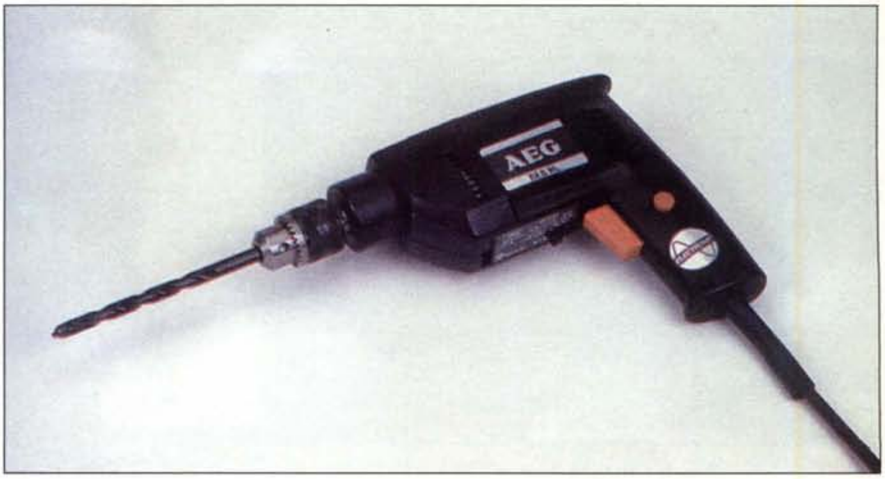
The motor shouldn't lag behind the gearing, so look at amperage values. Speed range is another factor to be considered when buying a drill. I like a full–ranged machine that goes above the 1,000 rpm mark, but if you're looking for serious torque, it's usually found at lower speeds. Either way, new electronic controls have almost eliminated tool over–heating.

Variable speed is a must for starting holes and all of the test units have that option. If you purchase an accessory that requires a speed beyond your drill's capacity, try slowing down the feed so that the cutter makes more passes over the stock. Just about any accessory you buy will have recommended speed ranges in the instructions. Never exceed the attachment's maximum or peak speed. I've seen accessories fly apart at real high speeds and it's not worth the risk. Here again, electronic controls are a blessing since they keep rotation speeds fairly constant. Lastly, pick a drill that feels good when you hold it—the way it feels in your grip and the balance. Even our best pick is worthless if you aren't comfortable with the way it feels.

AEG MODEL BE8R

This is a fairly fast machine (0–2100 rpm) and that broadens its abilities. The average speed for 3/8" drills is about 1,200 peak rpm, and this model sweeps right by those slow pokes. It does it without noticeable sacrifice to torque and for that reason it's worth a serious look. Faster isn't always better, and a broader speed range has a dark side too. Often a drill is run at full throttle because you're not concentrating on your fingers, but on the work–piece. A speedster like this one requires more attention. The oversized trigger on this unit fits up to two fingers, making it's easier to control.

Behind the chuck is a double seal that keeps sawdust from entering the gearing. It also keeps the lubricating grease inside the drill where it belongs. This is important because nine out of ten drills will never see additional grease after they leave the assembly line. AEG makes use of electronics in the unit and like the rest of their line, they don't skimp on the housing. It's composed of fiberglass–reinforced nylon, so dropping it on the shop floor won't bother it. The manufacturer also makes a beefier 5 amp version that peaks at 1,400 rpm. It comes with an industrial chuck, as well as an added



½ pound of weight.

The power–to–weight ratio on the model we tested was a little off. The machine's weight is about average for its class. We expected at least mid–size to match the bulk and that's what AEG supplied us. What we didn't like was strictly personal—the size and feel of the grip. Personal comfort is very specific to the user. You should be able to grip the handle in such a way that the line of pressure created by the pushing force of your hand's web passes through the chuck in a straight line. Where your hand's web sits is critical, and where your fingers grip the drill needs to be comfortable too. You'll have to check this model against your own hand size to determine if it's right for you. It has so many pluses, but it does boil down to personal comfort.

Actually, the machine holds its own, so if the 4 amp mark is acceptable for your drilling applications, this unit will meet your needs. (AEG Power Tool Corporation, Three Shaw's Cove, New London, CT 06320. 800–243–0870)

BLACK & DECKER MODEL 1170

We chose this particular drill because it offers dual–range for speed control (0–1400 and 0-3000 rpm), and it gives the user the versatility of having both a ¼" and ⅜" machine rolled into one. The 5 amp motor is the steam behind this unusual gear box and the combination provides smooth, high–end power as well as good low–end torque. Of course you pay for this option, not just in dollars, but also in weight. With cord and key accounted for, this drill weighs about 4½ pounds with the weight concentrated in the nose. Don't expect to compensate for the top–heaviness with an auxiliary handle since this particular design doesn't accept one.

The grip fit our hands well and all the testers agreed that the unit was among the most comfortable to operate. Though the torque and power of this machine is excellent, it only utilizes a two–stage gear reduction. This doesn't translate into power loss, however, since it still has enough gumption to make a 1½" spade bit easily carve through red oak.

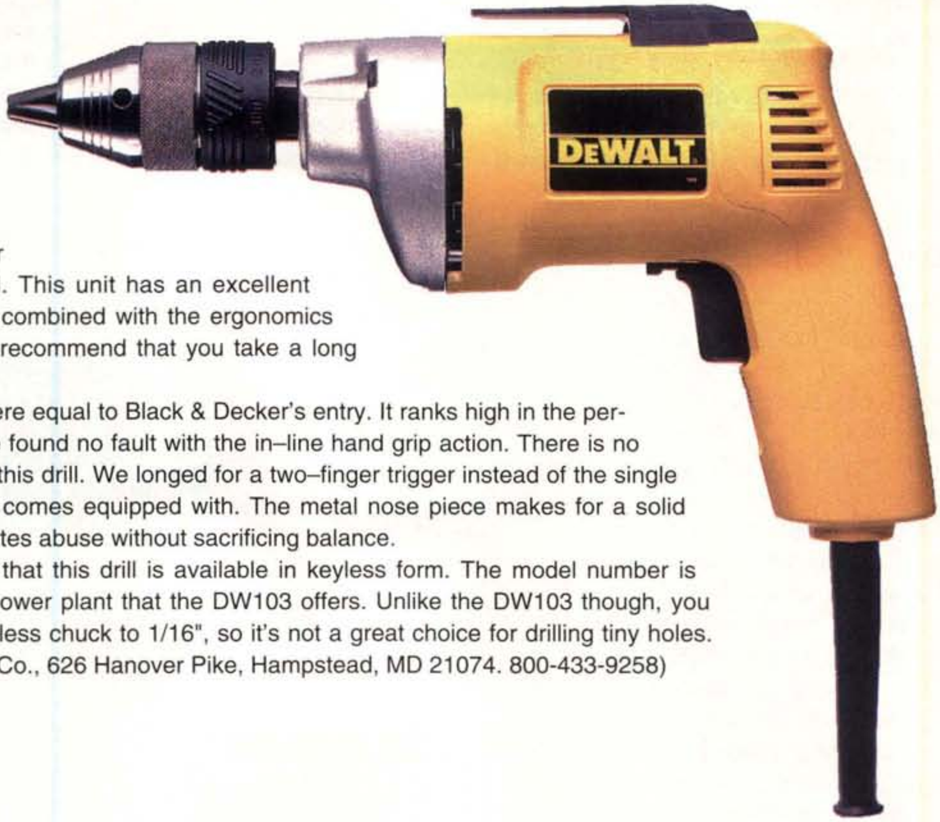
Construction–wise, you'll find an all–metal nose coupled with an industrial grade chuck that has minimal runout. Overall the unit scored well, even though it lacks electronic features. (Black & Decker, North Park Drive, Hunt Valley, MD 21030)

BOSCH MODEL 1022VSR

Here's a streamlined work of ergonomic art with an extra heavy–duty Jacobs™ chuck and a two–fingered trigger switch. The grip, our testers agreed, was above average and fit our full range of hands with excellent comfort. It's even acceptable when wearing gloves, and the reversing switch accommodates the extra layer of leather.

There's no auxiliary handle available, but that's acceptable because the nice grip gives the user good balance of the tool. The unit is no slouch for speed or torque, it turns a bit slower than its German counterparts, but under most conditions the 1100 rpm should suit the woodworker just fine. It weighs less than the other two German competitors which helps reduce fatigue when using the drill for long periods. Like most drills in the test, the entire housing is composed of a plastic composite.

By far, the best thing going for it is the operator comfort rating. There are no electronic or special features, but overall it does the job nicely and without added weight. (Robert Bosch Power Tool Corporation, 100 Bosch Blvd., New Bern, NC 28562. 800-334-4151)



DeWALT MODEL DW103

DeWalt has combined 3 pounds, 11 ounces of machine with 5 amps of power and the result is phenomenal. This unit has an excellent power–to–weight rating. That, combined with the ergonomics and beefy chuck, leads us to recommend that you take a long hard look at this drill.

The grip and handle size were equal to Black & Decker's entry. It ranks high in the personal comfort category and we found no fault with the in–line hand grip action. There is no auxiliary handle available with this drill. We longed for a two–finger trigger instead of the single digit version that the machine comes equipped with. The metal nose piece makes for a solid and sturdy drill head that tolerates abuse without sacrificing balance.

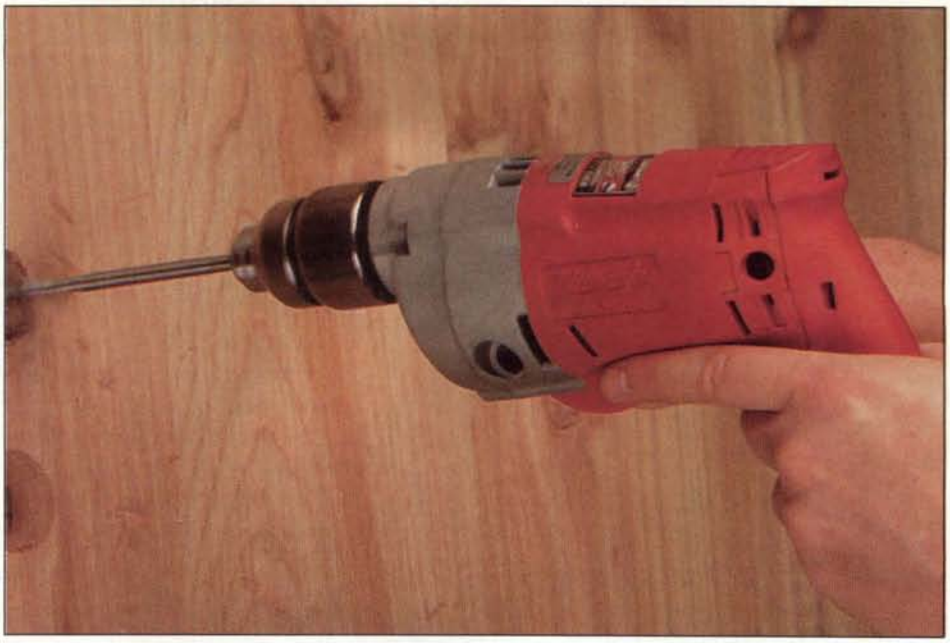
We would like to point out that this drill is available in keyless form. The model number is DW108 and it has the same power plant that the DW103 offers. Unlike the DW103 though, you can only tighten–down the keyless chuck to 1/16", so it's not a great choice for drilling tiny holes. (DeWalt Industrial Power Tool Co., 626 Hanover Pike, Hampstead, MD 21074. 800-433-9258)

HITACHI MODEL D 10VD

This new entry is equipped with electronics, but we didn't think that it was the most comfortable drill in the test. The single–finger trigger doesn't help the total grip situation. The optional auxiliary handle makes up for the less than state–of–the–art grip, so the overall comfort rating is about middle of the road.

The manufacturer has added a speed regulator for easy control, and the belt clip is handy when you can't set the tool down. With this model, Hitachi has produced a tool that forces Makita to update their contender. We liked the chuck, but overall this model left us feeling neutral. It might be a good idea for the Hitachi engineers to design some of the ergonomics incorporated in their new screw gun line to this drill. Then we'd really be cooking.
(Hitachi Power Tools U.S.A. Ltd., 3950 Steve Reynolds Blvd., Norcross, GA 30093. 404-925-1774)

MILWAUKEE MODEL 0225–1



These folks are known among electricians and plumbers as one of the best drill makers. We almost gave this particular drill the highest rating, but it lost half a point because it was the heaviest of our test lot and the chuck is keyless. We should explain that we like keyless chucks, but the Milwaukee slips on large spade bit tests and we thought that deserved a demerit.

On the other hand, the grip is nothing less than beautiful and the trigger assembly was engineered for comfort and durability. The nose is made of metal, not plastic, so it's better at resisting impact. A generous auxiliary handle screws on either the left or right side and holds its position with rigidity.

Incorporated into the grip is another Milwaukee exclusive called QuikLok™ that allows the operator to replace the cord in seconds with just a twist of the wrist. This is great when you need length but don't want to use an extension cord. It does wonders for fast cord repairs. Top this off with power that's among the highest in its class and you can see why we gave it such a great score. (Milwaukee Electric Tool Corporation, 13135 West Lisbon Road, Brookfield, WI 53005. 414-781-3600)

MAKITA MODEL 6403

The Makita handle design offers a nice feel and fits in most hand sizes with about average comfort. The housing is made of plastic composite and the manufacturer throws in a belt clip for good measure. It may not be very useful on the work bench, but belt clips are nice to have around when you're hanging on a ladder.

The weight is about average and it has a lot of power. It's faster than most, but not to the point of being excessive. Taking its cue from other drill makers, Makita installed a heavy–duty chuck on the front end. Unlike the competition, the reverse switch is in the base of the grip. This is nice if you're always bumping the switch when it's located at trigger–top, but it's not so great if you need to keep both hands in action while reversing. Overall, this unit did well with us and thanks to the power and speed we give it high marks. (Makita U.S.A., 14930 Northam St., La Mirada, CA 90638. 714-522-8088)

METABO MODEL 5042

The grip on this machine is one of the best made. It fits just about every size, shape and configuration that adult hands have to offer. There's a built–in groove for those times when you need to locate most of your hand up top for additional in–line pressure. A big two–fingered trigger puts the icing on the cake and a loop is provided so you can hang the machine up when it's not in use.

Electronics control the speed range and a dial on the trigger limits the top–end speed. That dial is a critical feature on this drill since the top speed is 2,700 rpm. Operating the unit without a regulator could be tricky. We think that the ultra–high turning speed is overkill, but we can't complain about the power–to–weight ratio. While it isn't the unit with the most muscle, it's not a weakling either.

Like the AEG drill, this tool uses a metric spindle thread size so don't look for a keyless chuck in the local hardware store to replace the standard chuck that comes with it. (Metabo Corporation, 1231 Wilson Dr., West Chester, PA 19380. 215-436-5900)

PORTER–CABLE MODEL 6611

Porter–Cable has recently introduced a new line of pistol grip drills that offer some of the best options for woodworkers. A new double clicking switch is part of the updated electronics on this unit. You now have the ability to override the regular electronics by pulling twice on the switch. This feature will undoubtedly save switches from early burn–out caused by overheating, and it makes sense if your application calls for complete, uncontrolled torque.

As for the feel of the grip, we rated this unit among the most comfortable. A two–fingered trigger makes both big and small hands feel at home and a unique push–button reverse switch eliminates the chance of accidental direction changes. The auxiliary handle is a nice feature too, but it only attaches on the left and that's not good news for lefties.

The unit is equipped with a belt clip for good measure. A beefy 5.5 amp motor accounts for the drill's unstoppable torque. Considering that this machine has the highest power rating in its class, the weight is darned good. You get more power than the industrial strength Milwaukee drill at about a pound less. Porter–Cable doesn't skimp on the chuck either and the metal nose piece means that this little monster should last a lifetime. It's our number one draft pick. (Porter–Cable, 4825 Highway 45 North, Jackson, TN 38305. 800-321-6443)

RYOBI MODEL D1010

At the top of Ryobi's ⅜" line stands this electronic unit. The grip was okay for most hands, but it's as brilliant as the Metabo in terms of ergonomics. The single finger trigger is typical to most of the Japanese offerings, and the manufacturer was thoughtful enough to build a belt–hook into the housing.

Our biggest concern is that this unit doesn't offer enough power. It's fairly light duty and only runs at 3.3 amps. Even though the drill is one of the lightest in terms of weight, it just doesn't make up for the reduction in power. There is a nicely made chuck screwed to the front end of the tool and unlike other foreign competitors, Ryobi uses a metal nose piece to increase durability.

A side handle screws into that metal half of the housing, but only on the left side, making it difficult for you south paws. If you're looking for the reversing switch, you'll find it under the grip, next to the cord. For a limited range, lightweight machine, this one does okay. If you want a general–duty drill, there are others that outrank it. (Ryobi America Corp., 1424 Pairman Dairy Rd., Anderson, SC 29625. 800-323-4615)

SEARS MODEL 27141

While we like many Sears tools, and we empathize with readers that have a restricted budget and look to Sears for a solution, we just can't give this unit a passing grade. The grip and housing are larger than most of the test group could tolerate. Almost every user encountered this awkward gripping stance—the unit is large. Once again, the size of your hand might reverse our low rating, but that's for you to decide.

The machine offers decent power and a good speed range. There's an auxiliary handle that screws into both sides of the metal nose piece, and a belt clip. There's also a speed control dial built into the trigger and a reasonable chuck. Our major criticism comes from the size factor. Keep in mind that woodworking often requires finesse, and that comes by way of control. (Sears Stores throughout the United States)

SKIL MODEL 6623

Starting out with the unusual, Skil places its reversing switch on the left hand side, above the trigger but on the side of the motor housing. We're not sure exactly who came up with this idea, but we would sure like to talk with them because it's very awkward. At almost every turn we unintentionally bumped that darned switch. The engineering advantage with this switch type and location is that the brushes get rotated with direction changes so they last longer. But this drill may not last long if it surprises you as many times as it did us. The manufacturer incorporates a metal nose piece and an optional 360 degree auxiliary handle that gives the user better control on the front end. Speed–wise, you're looking at the second fastest unit that we tested (0–2500 rpm). It's a little on the overkill side for woodworkers. As for comfort, we likened the styling of the handle to that of the DeWalt unit and that's a plus.

The 5 amp motor provides plenty of power and the light weight turns this unit into a serious contender, if you can put up with that reversing switch. (Skil Corp., 4300 W. Peterson Ave., Chicago, IL 60646. 312–286–7330)

Company	Model	Amps	Speed	Weight	Chuck	Capacity †	Score	Price
AEG	BE8R	4.2	0–2100	4lb 4oz	key	¾"	7	$136.00
Black & Decker	1170	5	0–1400*	4lb 7oz	key	1¼"	8	$259.00
Bosch	1022VSR	4.8	0–1100	4lb 3oz	key	1"	8	$195.00
DeWALT	DW103	5	0–1200	3lb 11oz	key	1½"	9	$198.00
Hitachi	D 10VD	5	0–1200	4lb 4oz	key	1"	7.5	$193.00
Milwaukee	0225-1	5.2	0–1200	5lb 3oz	keyless	1½"	9	$215.00
Makita	6403	5.2	0–1800	4lb 4oz	key	⅞"	9	$189.00
Metabo	5042	4.2	0–2700	4lb 9oz	key	1"	8.5	$146.00
Porter–Cable	6611	5.6	0–1000	4lb 4oz	key	1¼"	9.5	$210.00
Ryobi	D1010	3.3	0–1300	3lb 12oz	key	⅝"	7.5	$196.00
Sears	27141	4.5	0–1200	4lb 9oz	key	1¼"	6	$84.99
Skil	6623	5	0–2500	4lb	key	¾"	7.5	$176.00

* model has two speed ranges 0–1400 and 0–3000 † Spade bit diameter without loss of rpm in red oak.

Mesquite

by Ken Textor

For decades, the wood of the lowly mesquite tree has been called everything from a nuisance to a reasonably acceptable barbecue seasoning, but not much else. Yet as some woodworkers have discovered, it's actually a whole lot more.

General Description

There's only one species of mesquite you're likely to find in lumber form. Honey mesquite (*prosopis glandulosa*) dominates the U.S. lumber market. There are two other species of mesquite that occasionally get mixed into a load of planks. For woodworkers, there is no discernible difference among the species.

Until about 15 years ago, mesquite was considered a major nuisance for cattle ranchers in the Southwest. It grew and spread so rapidly it often became the focus of eradication programs. Now it's viewed as a viable source of income for lumber.

The heart of mesquite country is Texas, although the tree has spread into Arizona, New Mexico, Oklahoma, Colorado, and Southern California. The tree likes dry sandy soils where grasslands also thrive. The scarcity of water in the area is no problem since mesquite roots are known to burrow up to 100 feet to find adequate water. It prefers a subtropical to tropical climate, and various species have spread throughout Mexico, the Caribbean and even to Hawaii.

The tree itself is generally short and stubby, rarely taller than 40 feet. The trunk is very short and divides quickly into branch systems, making long or wide boards difficult to obtain. The leaves are small, green and somewhat waxy. Mesquite flowers in spring and eventually a small bean grows around the seeds.

The wood is dense, hard and shock–resistant. Its most important characteristic is dimensional stability, which is rated even better than the white cedars (*PW* #65) and Pacific redwoods. It's also heavy, weighing more pounds per cubic foot than white oak (*PW* #59) and pecan (*PW* #67). It is almost as strong and tough as those, but noticeably more brittle.

The color of the foliage is of a slippery green characteristic. The brown heartwood often has bright reddish hues when first cut. The small amount of sapwood and the streaking sometimes found in mesquite approach a buttery yellow color. But all mesquite colors darken after exposure to sunlight. The more exposure, the darker they become. The heartwood eventually becomes dark brown.

The grain is also a significant characteristic of mesquite. It's tight and closed with lots of variability. Because of the way the tree grows, the grain can swirl, turn back on itself or be somewhat knotty. Tension cracks, borer tunnels and internal bark pockets are common in most grades of mesquite lumber. In all applications, mesquite is very rot resistant, equal to or better than cedar.

The traditional woodworking use for mesquite was carved objects made by Native Americans before Europeans arrived. Indeed, Mesquite traditions are being established by today's woodworkers. Furniture, turned items and flooring all have been successful uses.

Working Properties

Working mesquite is fairly straightforward. It planes easily with no chipping even on planks where the grain is highly variable. Because of its hardness, it sands easily to a very fine finish. In fact, sandpaper stays virtually free of dust, probably because of the complete lack of wood oils.

Ripping and cross–cutting mesquite present no obvious problems. However, when cutting, sanding or planing, mesquite is an unusually dusty wood. A powdery mist may hang around the shop much longer than usual after these operations. Fortunately, the dust has a pleasant odor.

Turning mesquite is fairly easy—most of the shavings come off smooth and even. Occasionally, small chips may tear off and mar an otherwise smooth surface. Occasional faults in the wood can go completely undetected. For no apparent reason, you may have turnings simply split in half in the middle of working on them.

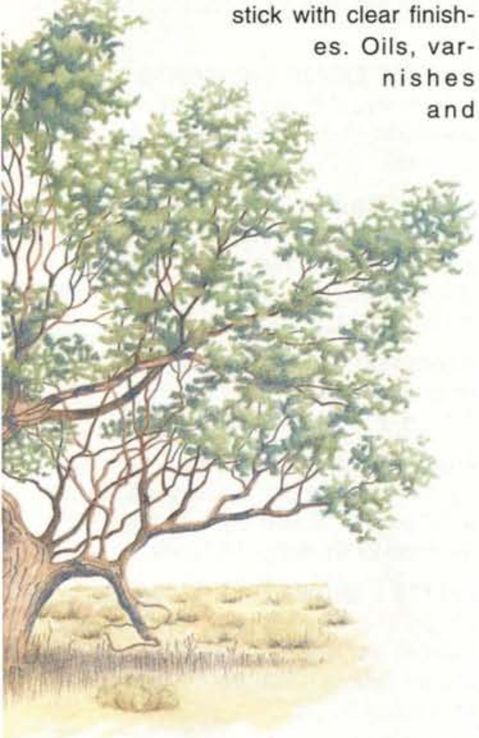
Fastening mesquite presents no problems, but a pilot hole is necessary. Without it, the wood tends to split. Even with a pilot hole, splitting may occur if a screw is driven too hard. However, mesquite holds fastening well, and no lubricants are necessary.

All glues work well with mesquite. When using epoxies, scoring is necessary because of the tight grain. With aliphatic–based glues, the tight grain makes requires less glue.

Finishing

Mesquite's tendency to darken as it ages must be taken into consideration when finishing. If you feel the need to stain this wood use a lightening wash—white or light red—rather than a darkening stain.

The grain and color of mesquite is so interesting by itself you may want to stick with clear finishes. Oils, varnishes and polyurethanes work fine. Even water–based polyurethanes, which tend to raise the grain in many hardwoods, fail to adversely affect mesquite. The wood is an excellent one for beginners in the finishing department.



Availability

Mesquite has become available only recently to woodworkers outside Texas and the Southwest—mostly through mail order. Few hardwood suppliers outside of the native habitat warehouse the wood.

Prices for some select grades of mesquite are in the exotic import range. The price range for all grades is from $2.50 to $9 per board foot. The higher price is for select clear lumber, the lowest for rustic grade, four–quarter stock. Eight–quarter is usually about ten percent more. If you specify boards-longer than eight feet and wider than six inches, you may have to pay an additional premium.

You have to be a bit careful with the mesquite grading system. It is loosely based on the standard hardwood grading system. But graded mesquite lumber often comes with a few more defects than is customary. For example, select lumber is 95 percent clear of defects only on one side of the board. That means the other side can and often does have noticeable defects. This doesn't fit the National Hardwood Lumber Association definition of select lumber, but mesquite suppliers say the tree's growing conditions necessitate a more liberal interpretation of lumber standards. Grade #1 is 50 percent clear on one side with cracks and worm holes possible. Grade #2 is 25 percent clear with defects allowed and rustic grade is, shall we say, a special challenge to work.

Mesquite veneers are available from some suppliers, although you may have to special–order them. Prices range from $3 to $6 per square foot. I can't find sources of mesquite plywood. Dimensional mesquite stock, more than eight-quarter in thickness, is available but it must be special ordered several weeks (or months) in advance.

Without a doubt, the popularity of mesquite among woodworkers is reported to be growing rapidly. It soon may come as no surprise that the wood so cavalierly used by the barbecue masters of America to flavor ribs, steaks and chops may become a little more precious, and quite a bit more than just firewood.

Ken Textor works wood and writes about it in Arrowsic, Maine.

The following are some randomly selected sources of mesquite lumber. There are dozens of other suppliers in the Southwest, but this should help you get started in finding the best supplier for your needs:

Texas Kiln Products
Route #1, Box 66
Bastrop, TX 78602
(512)237-5385

San Pedro Mesquite Co.
Benson, AZ 85602
(602) 622-4307

Hardwood Lumber Co. of Dallas
10551 Goodnight Lane
Dallas, TX 75220
(214) 869-1230

South Texas Molding
P.O. Box 549
Alamo, TX 78516
(800) 444-2881

CLASSIFIED

TOOLS

Repair band saw blades! Easy contour sawing!

ELECTRO BAND SAW BRAZER #101B

Make your own saw blades from coil stock.
Brazer complete with kit $89.75.

NELSON & JACOBSON, INC. 3546 NO. CLARK ST., CHICAGO, IL 60657

50% DISCOUNT. Stainless and brass screws. Tools. Free catalog. Elwick, 230 Woods Lane, Somerdale, NJ 08083.

CALL 800-872-6500. WOODWORKING supplies, Tools, Accessories, Books. Metalworking Machinery Also Available. Catalog $1.00. Blue Ridge, Box 536–PW, Hurricane, WV 25526.

PLANS AND KITS

BENCH/PICNIC TABLE
Full Size Woodcraft Patterns

- ☐ Our 48" park bench pivots into a one-sided picnic table!
- ☐ Create 25 "wind-action" whirligigs - lots of fun!
- ☐ 100 yard ornaments; animals, birds, signs, more!
- ☐ Attractive Dutch Windmill - 5' tall including blades.

Send $8.00 per packet · Pick 3 for only $18.00
MC/Visa · Fax (603) 332-4579 · Catalog $2.00 (Free w/order)

ACCENTS, Dept. MR63, Box 7387, Gonic, NH 03839

2000 PATTERNS fun/profit. Catalog $2.00. E–Z Design, P.O. Box 234 Dept–C, Washington Mills, NY 13479.

40 EASY TO MAKE PLANS for crafts or gifts. Birdhouses, shelves, lawn ornaments, folding deck or lawn table, picnic table, lawn or porch swing, deacon bench, Adirondack style chair, wall cabinet, doghouse, corner shelves, etc. For 40 plans send check or money order for $6.95 to Pinecraft Patterns, P.O. Box 13186, Green Bay, WI 54307-3186. WI residents add 5% sales tax.

NEW JIGSAW DESIGNS! Ornaments, Racks, Totempoles, Kachina, Yardcriters on HOPTPRESS™ wood transfer patterns. Send $2.00 for catalog and FREE HOTPRESS Pattern. DOGWOOD HOLLOW CRAFT PATTERNS, P.O. Box 932, Dept. PW, Mullins, SC 29574.

PLANS FOR 350+ TOOLS. Catalog $1.00 (refundable). Wood–Met Services, Dept. PW, 3314 W. Shoff Circle, Peoria, IL 61604.

PYRAMID PLANS: Easy to build from wood, cardboard, etc. To order, send $3.75 to Sir Forms, P.O. Box 595, Hudson, OH 44236.

MAKE "ASTONISHING" BALANCING TOYS!!! Wooden "performing" animals...people! Thrilling results! Details...free!!! Send today! Pleasure Crafts, PWST, RT2–1485, Mannford, OK 74044.

DETAILED PLANS FOR WOOD FOLDING sawhorse/extension table. $7.95—postage $2.00. B. Thompson, Rt. 1, Box 625, Scandia, KS 66966.

Pattern—Folding Rocking Chair

Build for Profit or for your own Patio. Detailed Instructions. Send **$12.95** to:

Howard Carol Chairs Inc.
5116 Jennings Dr.
Ft. Worth, TX 76180

GUARANTEED MONEY MAKING PROJECTS or just for fun. FULL SIZE unique patterns. Rocking Horse, Rocking Bi–Plane, Toy Box, Child's Table. For brochure send $2.00 S.A.S.E. to Heirloom Toy Designs, P.O. Box 7171, Depot 4, Vic. BC, Canada, V9B 4Z3. No cheques please.

MAKE WOODEN TOYS, whirligigs, door harps, dollhouses, clocks, music boxes, weather instruments, crafts, furniture with our plans, parts, kits, supplies. Catalog $1.00. 800-848-4363. Cherry Tree Toys, Belmont, OH 43718-0369.

BOAT PLANS, PATTERNS, & KITS— Unsurpassed selection. 7' to 55' Powerboats, Rowingboats, and Sailboats. Quick/simple stitchenglue. 168–page DESIGN BOOK—$4.00. Includes FREE "Boatbuilding Supplies" catalog. "Epoxy Manual" $2. **GLEN–L**, 9152 Rosecrans, Box 1804/PW3, Bellflower, CA 90706. Phone: 310-630-6258.

Build
"The Kitchen Closet"
A patented dispencer for three food wraps that hangs under your kitchen cabinet.
The cook will love it!

To get your plans, send $15.00 check or M.O. to:
GNORP ENTERPRISES
5831 Bristlecone Ct., St. Louis, MO 63129

ROUND TOP WOODEN TRUNK: many uses. For plans send $3.75 to: Sir Forms, P.O. Box 595, Hudson, OH 44236.

WOODEN–GEARED, WEIGHT–DRIVEN, pendulum regulated clock plans. Average skill level. $15.00. BOB MEYER, Box 275, Elgin, MN 55932.

BUILD YOUR OWN WATERBED AND SAVE: Mattresses, Heaters, Massage Systems, MORE! Send $2.00 for Catalog with FREE plan set. Woodins' Waterbed Connection, 45 Industrial Park PW, Albany, NY 12206.

FIVE FAMOUS PLAYHOUSE PLANS BY RBR WOODWORKING, Box 295, St. Michael, MN 55376. Book $10.

TABLE SOCCER. Regulation size with automatic ball return. Made from hardwood–for years of rugged play. For complete plans and instructions send $10.95 to: Custom Wood Designs, 1472 Elmhill Cir., Murray, UT 84123.

FLOWER BOX ENHANCERS–SCROLL SAW PLANS, colorful characters brighten planters. $4.00 Goetz Enterprises, 218 Bramber Drive, Broomall, PA 19008.

TWENTY BIRDHOUSE PLANS–(DESIGNED 100 YEARS AGO!) Bluebirds, Martins, Songbirds, $5.00. Woodartist, Box 31564–PW1, Charleston, SC 29417-1564.

DUST FREE SANDING TABLE Complete plans and list of materials for building this unique yet simple system. Removes fine sanding dust where expensive systems fail. 1-800-874-5138. Aqua–Flo Inc., P.O. Box 396, Lavaca, AR 72941. Plans $9.95 for ready to use table top models $49.95 + $7 S&H.

DESIGNER GAZEBO BIRDFEEDERS: sell for $175 in shops. Send $1 for details, picture. WaltWorks—I, 7 White Oak Road, Asheville, NC 28803.

GET "THRILLING" WOODCRAFT RESULTS!!! Make balancing, mechanical, performing—toys, novelties,...more!!! Free brochure!!! Send today!!! Pleasure Crafts, PWYK, RT2-1485, Mannford, OK 74044.

TOY/BLANKET CHEST PLANS. TWO FREE birdhouse plans included! Send $5 to E&E Projects, P.O. Box 585, Snead, AL 35952.

ADJUSTABLE ROLLER STAND, build it yourself for under $20.00. Detailed plans, send $4.50 to PATTERSON ENTERPRISES, 719 Hitchingpost, Granbury, TX 76049.

CREATE A SHOWPIECE! Wooden Santa, sleigh, and four reindeer. 25 feet long! Detailed plans/instructions. Check $9.95: Colvard Designs, Dept. 8, 149 Forest Drive, Wilkesboro, NC 28697.

INCREDIBLY SIMPLE CLAMPS for under 50 cents each. Make them yourself. Complete plans $6.00 from: Whimsy Woods, Box 20 PW, Perryvale, AB, T0G 1T0.

AMERICAN PRIDE

UNCLE SAM pattern & instructions for lawn, garden or campsite. Order now for **JULY 4th! $6.95**+$1.25 s/h.

Send to: **"Uncle Sam"**,TF Enterprises
16045 Codo Drive
Lockport, IL 60441

Check, M.O. & Visa/MC accepted. (Please enclose mailing address and phone number. Allow 2-3 weeks for delivery. C/card sent immediately.)

BUSINESS OPPORTUNITIES

EASY WORK! Excellent pay! Assemble products at home. Call toll free 1-800-467-5566 ext. 3445.

LET THE GOVERNMENT FINANCE your woodworking business. Grants/loans to $500,000. Free recorded message: 707-448-0270. (KC1).

ASSEMBLE EASY WOODCRAFTS AND MORE AT home. Nation's most respected program. Guaranteed! 1-800-377-6000 ext. 7110.

CUSTOM MADE BUMPERSTICKERS maximum 44 spaces. $3.50 per bumpersticker. "King Edward's Shop" 3056 North Gladstone, Indianapolis, IN 46218.

The tools you need to Buy Right the First Time!

BRIDGEWOOD

Machinery and accessories for professional quality woodwork are available by mail from our new, exciting Bridgewood® Machinery and Accessories catalogs. Send $1.00 for both catalogs.

WILKE Machinery Company
3230 Susquehanna Trail, York, PA 17402
Telephone: 717-764-5000

93A

WOODS

QUILTED, CURLY, BURL, SPALTED MAPLE. Boards, Blocks, Flooring. Special—25 Bd. Ft. Figured Shorts—Free Shipping—$100. RANDLE WOODS, P.O. Box 96, Randle, WA 98377. 800-845-8042.

MICOTHIN LUMBER. 1/4, 3/16, 1/8, 1/16 INCH thicknesses. Widths to six inches. Clear and surfaced on four sides. Lowest prices available. South American and African Mahogany, Walnut, Cherry, Oak, Poplar. Please write for details and price list. West Friendship Hardwoods, P.O. Box 103, West Friendship, Maryland 21794.

HARDWOODS: WALNUT, CHERRY, red oak, mahogany, any species, plywoods and milling available. Call or write for prices: F. Scott Jay & Company, P.O. Box 706, Millersville, MD 21108. 800-888-9337.

"GOOD WOOD," Pennsylvania Hardwoods, Many Species & Sizes, free catalog: Croffwood Mills, RD 1, Box 14L, Driftwood, PA 15832. 814-546-2532.

OREGON BLACK WALNUT—wide boards, thick material, exceptional color, SASE—Goby Walnut Products, Dept. PW, 5016 Palestine Rd., Albany, OR 97321. 503-926-7516.

BOOKS AND CATALOGS

WOOD PRODUCTS CATALOG. Extensive line of craft supplies. Shaker pegs, dowel rods, wheels, etc. Hardware accessories also available. Free catalog. Wood–N–Crafts Inc., Dept. 2-A, Box 140, Lakeview, MI 48850.

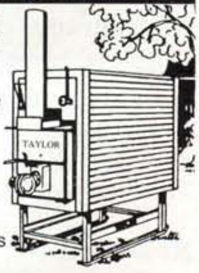
FREE ILLUSTRATED CATALOG of books for woodworkers: instructions, scaled drawings, patterns for furniture, toys, house carpentry, duck decoy, bird and figure carving, wood sculpture, lathe work, more. Most $4.00 to $6.00. Write Dover Publications, Dept. A226, 31 E. 2nd Street, Mineola, NY 11501.

PROFESSIONAL STAINED GLASS SUPPLIES. Learn fascinating craft! Catalog $2.00 with free bonus coupons, instruction booklet. Whittemore, Box 2065MU, Hanover, MA 02339.

WOODCARVERS CATALOG: NEW 1993 CATALOG filled with over 1200 items just for the woodcarver. Send $2.00, P.O. Box 3485, Estes Park, CO 80517.

WOOD PRODUCTS WHOLESALE, pegs, spindles, wheels—250 items in stock. Howee's, Rt. 7, Box 633PW, Joplin, MO 64801.

WATERSTOVES



The safest, most efficient wood heat system on the market, the TAYLOR waterstove sits outside and heats your home *and* 100% of household hot water.
- UL listed
- Thermostatic control
- 12 to 24 hour burn time
- Stainless steel eliminates bottom corrosion

Call 1-800-545-2293 for more details.

TAYLOR MANUFACTURING, INC.
PO Box 518, Elizabethtown, NC 28337

MISCELLANEOUS

POST OFFICE BOX BRONZE DOORS: No. 1 $6.00; No. 2 $6.50; No. 3 $9.00; plus $1.00 each shipping. SASE to: Hubbert Woodcrafts, P.O. Box 1415, Fletcher, NC 28732. 704-687-0350.

BUILD, RESTORE, REPAIR, REFINISH! Carvings, Moldings, Brass, Hardwoods, Veneers, Upholstery, Caning, Lamps. $1.00 for unique wholesale catalog. Van Dyke's Dept. 50, Box 278, Woonsocket, SD 57385.

CHAIR CANING AND BASKETWEAVING SUPPLIES. Large selection weaving materials, Shaker Tape, books, handles, tools, etc. Retail and wholesale. Catalog $1.50. Refundable. Royalwood Ltd., 517-PW, Woodville Rd., Mansfield, OH 44907. 419-526-1630.

PC SOFTWARE, COMPREHENSIVE WOODWORKING INDEX: 15 journals, 457 issues, 11286 articles, update service. $44.95 free S&H, Infodex Services, Dept 7004, 10609 King Arthurs, Richmond, VA 23235-3840. Free information.

Index to Advertisers

Crafter's Mart....97
Cryderman Productions Inc....97
Econ–Abrasives....15
Enlon Import Co.....Back Cover
Furniture Medic....11
MLCS....9
Popular Woodworking Back Issues....16-17
Popular Woodworking Binders....15
Ryobi....2
Tole World....99
Wagner Spray Tech. Corp.....13
Warren Tools.....97
Weekend Woodcrafts....3
Wood–Mizer....97
Woodworks....14

TELL THEM YOU SAW THEIR AD IN
Popular Woodworking

CLASSIFIED INFORMATION:

Classified Rate: $2.50 per word; 15–word minimum. **One–Inch Marketplace:** $250 per issue. Payment must accompany all ads (not commissionable). Deadline for Issue #74 (Aug/Sep 1993) is May 31, 1993. ***Popular Woodworking***, Dept. Class., 1041 Shary Circle, Concord, CA 94518 (510) 671-9852.

Calendar

Events of Interest to Woodworkers

If your group is having an event you would like *other woodworkers* to hear about, please send us all pertinent information at least four months before the opening date. We will publish it for you in *Calendar* free of charge.

California

International Festival Of Masks: (10/15-16) Hancock Park, Los Angeles, CA

Contact: Craft & Folk Art Museum, Information line at Tel. 213-937-5544

Tapestry In Talent: Celebrates The Year of the Craft: (9/4-6) Street festival of arts and crafts, San Jose, CA 95113

Contact: For event info. Tel. Brent Baer at 408-293-9727

Colorado

Wood Carving Festival: (7/16-25) 2613 Alteza Lane, CO 80917

Contact: Secretary Don Yates, Tel. 719-574-8323

Conneticut

Mini Vacation Workshops: (8/6-22) Featuring "Build A Boat In A Week" Brookfield Craft Center, Inc. P.O. Box 122, Brookfield, CT 06804

Contact: John I. Russell, Tel. 203-775-4526

Illinois

Hands On Woodworking Seminars: (6/18-7/31) Cliffe Cabinets, P.O. Box 116, De Kalb, IL 60115-0116

Contact: For seminar scheduling Tel. 1-800-383-9067

Sixth Annual Midwest Salute to the Masters: (8/24-26) Longacre Park, Fairview Heights, IL

Contact: Harvey Noubarian or Carol Warner; Directors, Tel. day, 618-397-9111, Tel. night, 618-632-9652

The Quad Cities Woodworking Show: (6/18-20) QCCA Expo Center, Exhibition Hall, 2621 4th St., Rock Island, IL

Contact: For more information call 1-800-826-8257, 8-5 PM pacific time.

Iowa

International Woodcarvers Congress: (6/24-27) Putnam Museum, Davenport, IA

Contact: For further information please write to: Mr. Larry Yudis; Affiliated Woodcarvers, Ltd. P.O. Box 10408, Bettendorf, IA 52722-8408 or Tel. 319-359-9684

Holzfest Woodworking Exhibition: (8/20-22) Little Amana, Iowa, 50208

Contact: To attend, enter projects to sell or display work, send S.A.S.E to Ron Toppenberg, 713 E. 5th St. N., Newton, IA 50208

Maryland

Woodworking World Show: (4/2-4) Picksville Armory, Picksville, MD

Contact: Woodworking World Show Information line at Tel. 1-800-521-7623

Michigan

Midwest-Grand Rapids Woodworking and Furniture Supply: (11/4-5) Grand Rapids, MI

Contact: Eidson Trade shows, Inc., P.O. Box 609, Conover, NC 28613, Tel. 704-459-9894, FAX 704-459-1312

Woodworking Show: (6/11-13) Stadium Arena, East Hall, 2500 Turner Ave., N.W., Grand Rapids, MI

Contact: The Woodworking Shows, 1516 South Pointus Ave., Los Angeles, CA 90025, Tel. 310-477-8521, FAX 310-312-6684

Minnesota

Wood Carving Workshop: (8/8-14) Villa Maria Retreat Center, Old Frontenec, MN

Contact: Villa Maria Wood Carving Workshops, P.O. Box 37051, Minneapolis, MN 55431

New Jersey

Peter's Valley Craft Fair: (7/24-25) Peter's Valley Craft Center, 19 Kuhn Road, Layton, NJ 07851

Contact: Peter's Valley Craft Center, Tel. 201-948-5200

New York

Christmas '93 Art and Craft Spectacular: (12/3-5) 200 craftspeople and artists. New York state fairgrounds, Syracuse, NY

Contact: United Craft Enterprises, Box 326, Masonville, NY 13804, Tel. 607-265-3230

American Crafts Exhibit: (10/21/93-2/27/94) American Craft Museum, 40 West 53rd Street, New York, NY 10019

Contact: Information line at 212-459-0926 or FAX 212-459-0926

North Carolina

International Lathe–Turned Objects Challenge V: (7/10) deadline for all entries

Contact: For an Application send S.A.S.E. to Wood Turning Center, P.O.Box 25706, Philadelphia, PA 19144 or Tel. 215-844-2188, FAX 215-844-6116.

Ohio

Conover Workshops: (7/12-8/14) 18125 Madison Road, P.O. Box 679, Parkman, OH 44080

Contact: For class reservations and schedules contact Tel. 216-548-3491, FAX 216-548-2721

Oregon

The Year of American Craft: (6/21-11/13) Oregon School of Arts and Crafts, 8245 Southwest Barnes Road, Portland, OR 97225

Contact: Hoffman Gallery attn. Susan Laarman or Betsy Klima, Tel. 503-297-5544. Events in book arts, ceramics, drawing, fibers, metal and wood.

Twentieth Annual Christmas Show and Sale: Western Woodcarvers at the World Forestry Center, 4033 SW Canyon Rd., Portland, OR, near Washington Park Zoo.

Contact: Judy Dykgraff, P.O. Box 2214, Vancouver, WA 98668-2214

Pennsylvania

Woodworking Seminars: (6/26-12/12) The Olde Cabinet Shoppe offers many seminars by many familiar names in the woodworking world. 1660 Camp Betty Washington Road, York, PA 17402

Contact: For more information on classes offered Tel. 717-755-8884, FAX 717-755-5688.

Pennsylvania Crafts Festival: (9-11-12) 175 Professional Craftspeople and Artists. Wrightstown Fairgrounds, Wrightstown, PN

Contact: United Crafts Enterprises, Box 326, Masonville, Ny 13804, Tel. 607-265-3230

Wisconsin

Woodworkers Extravaganza: (7/12-16) Minuteman Inc., 115 Monroe Street, Waterloo, WI 53594

Contact: For further information, details and schedules, Tel. 1-800-733-1776, FAX 1-414-478-3966

Germany

American Craft Showcase: (8/1) 10,000 International Exhibitors, Frankfurt, Germany.

Contact: The Rosen Group, Inc., 3000 Chestnut Avenue, Suite 300, Baltimore, MD 21211 Tel. 410-889-1320 FAX: 410-889-1320. For travel info. and reservations Tel. 1-800-43-CRAFT

Mexico

Tecno Mueble Internaçional: (7/8-11) International Exhibit of Šuppliers, Guadalajara, Mexico.

Contact: Eidson Trade Shows, Inc. P.O. Box 609, Conover, NC 28613

The Ontario
WOOD
Cryderman Prod. Inc.
Shows
...finest in woodworking
wood crafts – seminars & demos

CHATHAM - Apr. 23-25 Kinsmen Auditorium & Memorial Arena - Queen at Tweedsmuir

PICKERING - Oct. 15-17 Metro East Trade Centre - Hwy. 401 & Brock Rd. N.

All Show Hours: 12-9; 10-6; 10-5

CONTACT: Cryderman Productions Inc.
136 Thames St., Chatham, ON
N7L 2Y8 • (519) 351-8344

PRANCER
When you push his tail he plays "Rudolph" while his red light nose blinks to the music. About 17" ht.
#01556N Plans 3.00
#04556NZ Plans and Parts Kit 7.25
Parts Kit Only:
#04556N 4.75/Ea, 12.90/3, 38.50/10

RUDY
Push his nose and he plays a Christmas melody while lights in his antlers blink time with the music.
#01569 Plans 3.50
#04569Z Plans and Parts Kit 8.20
Parts Kit Only:
#04569 5.70/Ea, 15.90/3, 48.30/10

Parts Kits include all needed items to complete the project - EXCEPT LUMBER.

MR. & MRS. SANTA
Both play Christmas music when you push their nose. Very popular holiday project.

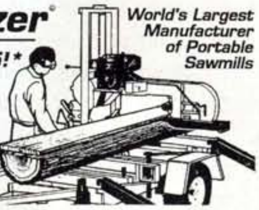
#03909 Plans 6.50 #06909Z Plans & Parts Kit 13.50
#06909 Parts Kit Only: 8.00/Ea, 21.45/3, 63.00/10

CRAFTER'S MART
P.O. BOX 2342-A • GREELEY, CO 80632
72-Page CATALOG: $1, Free with any order. Check, MasterCard or VISA (include daytime phone, card no., exp. date & signature). PROCESSING CHARGE: Continental U.S. $4; AK, HI, APO & FPO $10; Canada $16; Foreign 20% plus $10 (U.S. Funds). CO Res. add 3% tax. PHONE ORDERS: 8am-5pm Mon-Fri, Mtn. Time. Info: (303) 351-0676
1 - 800 - 999-3445 Ext. 22

See "Carve A Leaf" on page 68.
US send ck. or m.o.
NY Res. add tax.
Canada & Foreign send M.O. ONLY.
Canada: $23.95 PPd
Foreign: $27.95 PPd
COD UPS Available in the USA only.
Catalog Only $1.00
Warren Tool Co. Inc.
2209–1 Rt. 9G
Rhinebeck, NY 12572

Carve A Leaf Special
#CAPS–1
$19.95 P.Pd.
USA Only
You only need to buy (1) handle for carving. Warren's walnut interchangeable concept (shown), with solid brass jaw, allows you to change gouges. Prehoned Long Bent Gouge is all you need.
Tel. (914) 876-7817

Wood-Mizer®
World's Largest Manufacturer of Portable Sawmills
*Models from $6995!**
Own a Sawmill!



1-800-553-0219
32-Page Full-Color Catalog $2.00
Business Profitability Booklet $2.00
66-Minute Demonstration Video $10.00
Mastercard or Visa Accepted
**Shown with optional trailer*

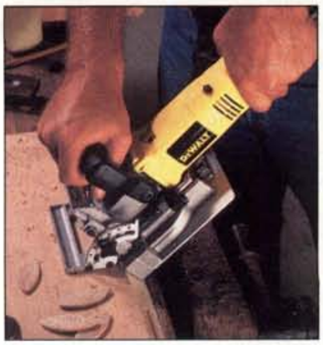
Wood-Mizer Products, Inc.
8180 West 10th Street Dept. DF19
Indianapolis, IN 46214-2400

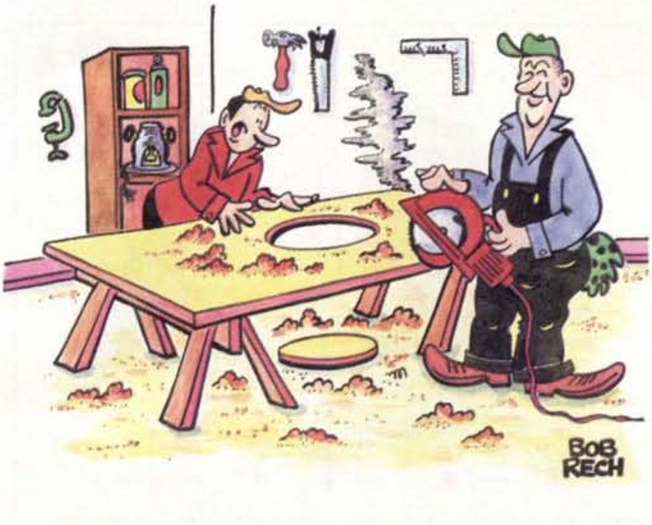
Popular Woodworking's CAPTION THE CARTOON Contest sponsered by DEWALT

DEWALT
High Performance Industrial Tools & Accessories

Readers are invited to submit their captions for this cartoon to Popular Woodworking, Cartoon Caption, 1041 Shary Circle, Concord, CA 94518. The deadline for entries is August 1, 1993. The entries will be judged by the woodworking staff. A winner and two runners up will be chosen.

The two runners up will each receive a one year subscription to *Popular Woodworking*. The winner will receive the new DeWalt Plate Joiner, model DW682K. State–of–the–art features include: integral tilting fence with rack–and–pinion height adjustment; retractable steel anti–slip pins on the base; a 6.5 amp, gear driven 100 percent ball bearing motor; and a top handle for added control. Additionally, the Plate Joiner comes with a one–year free parts, labor and loaner tool warranty.





Out of the Woodwork

by Lou Henry

If I Could Be Like Tim

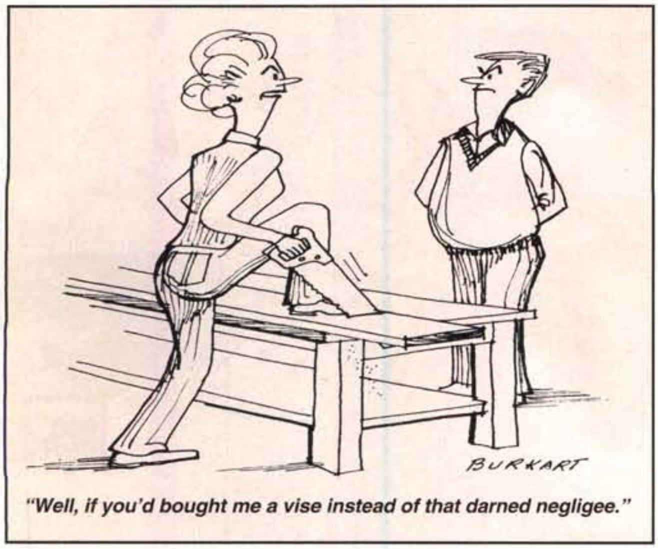
A few months ago, I walked into staff meeting and said, "Let's start this meeting off with a good grunt." Uh–uh–uh, uh–uh,uh, I intoned. The looks I got suggested a loss of employment at best, a fitting for a long–sleeved jacket at worst. I shrugged sheepishly, "Just kidding."

Later that evening, as I watched the Bulls shoot hoops, a commercial came on for some green liquid. A ditty played in the background as cameos of Michael Jordan flashed across the screen. I swear the singers chanted, "If I could be like Tim...," and I said the same. Others in the bar gave me looks like those at the staff meeting. It seems they heard the singers wanting to "be like Mike," which actually made more sense since there were no Tims anywhere on the screen. A few culturally deprived elbow–benders wanted to know, "Who the hell is Tim?"

Hey, I'm pretty quick to catch on, so I took the message as a sign. Time to connect with wood, dirt, sweat, blood and bruises. Uh–uh–uh! Life, after all, is more than profit margins, traffic jams, and whether or not brown shoes go with blue suits.

All this became clear to me when I noticed people bunched around a demo at the mall. A mystical experience unfolded as I watched that beautiful piece of machinery at work. It was a saw, a drill press, a lathe, a sander...a maker of dreams. It was my ticket to male happiness. My last chance to honor some construction–oriented gene that was at last demanding equal time. I could smell the sawdust, feel the pride of exhibiting a fine cabinet, an excessively ornate picture frame, or a birdhouse to rival the Taj Mahal. I wrote out a check immediately for one month's salary and grunted all the way home.

After a week of pouring over indecipherable instructions, I stood, band–aided hands on hips, admiring my magnificent machine, now transformed from a box full of parts and pieces into an integrated, well–oiled, humming work horse.



"Well, if you'd bought me a vise instead of that darned negligee."

My first project was to make saw fence extensions. I carefully put the drill press in an upright position, locked the bit in place, measured the depth, turned on the machine and slowly brought the spinning metal probe in contact with the wood. Wonder of wonders! A beautiful, smooth, perfect hole appeared in the board. With confidence, I fashioned a countersink to hide the head of the bolt when I assembled this masterpiece. What a proud day! Tears neared the surface of my amazed eyes. My woodworking confidence was never higher. Pure power was mine. I could fashion something out of wood, out of my physical environment. Hot diggity.

At work, my office had been the subject of a long standing joke. The joke was the mess—the junk mail, manuscripts, records, unanswered phone messages, unread memos, old coffee cups, a half–eaten sandwich from the last full moon, buried pens, a wire suggesting the presence of a telephone. Not so with my shop. Since its inception—that is, since I transformed an equally organized garage into a wood shop—neatness and order have prevailed. Outlined tools hang nealty on pegboards, wood is stacked with military precision, and my shop vac sucks up sawdust and dirt balls after each work session. Mom would be proud.

Then a really strange thing happened. It started with my study at home. It was as if it became self–neaten–ing. After a couple of weeks, I could see the top of my desk, find what I was looking for within minutes, and sit on an empty chair. But what frightened my co–workers was that this also happened at the office. I even chucked the half–eaten sandwich. All this was unconscious. I don't even recall when the telephone made its appearance. A painless disease—neat–itis.

Now, when I wake up in the middle of the night, do I worry about bills? About the report due at work tomorrow? Not me. I now lie there figuring out how to assemble the bottom, sides and top of a cabinet using biscuit joints. Do you pour the glue in the hole? Do you soak the biscuit with glue? If the biscuits expand with the glue, do you need to clamp everything together and let it all dry? What other books on wood stuff do I need?

Like Tim, I wonder how I can get more power. What other pieces of expensive equipment do I need? I know I need a jointer and, who can do without a bandsaw? Hmm, all these additional necessities will cost more than the original piece of equipment. But who cares? I'm feeling like a nine–year–old wishing for a new bike. The big difference is that I'm the dad now. The credit cards are mine! I say yes or no.

I've begun to think I am dangerous. Uh–uh–uh, uh–uh–uh! Pass that woodworking catalog dear. PW

Stained for life?

Before you slap on that coat of stain, let Tole World show you what else you could do to beautify that special project with a FREE TRIAL ISSUE.

Tole World for a fantastic finish!

You have options!

Tole painting is a beautiful way to finish off any project. From simple accents to fully finished projects, Tole World is full of creative ideas.

- Large PullOut™ patterns
- Comprehensive instructions
- Total finishes
- Tips on paint, brushes, applications
- All kinds of accent patterns, flowers, scroll work, leaves, decorative scenes

FREE ISSUE

If you like what you see, send just $14.97 for a total of 6 big issues. That's 37% OFF the cover price. If you decide not to subscribe, send back the bill marked CANCEL, the issue is yours to keep, ***FREE!***

YES! Send me my trial issue of ***Tole World.***

Name ______________________

Address ______________________

City ____________ State ______ Zip ______

Send to: Tole World, Dept. SQJR8, Box 52995, Boulder, CO 80322-2995

10" TABLE SAW

***EN-TB10**
- 1-1/2HP 110/220V
- CAST IRON TABLE

REG: $350.00
SPECIAL: $335.00

10" HEAVY DUTY TABLE SAW

***EN-HTB10**
- 3HP 220V
- TRIPLE V BELT DRIVE, 5/8" ARBOR
- SOLID CAST IRON TABLE+WINGS
- PRECISION FENCE + MITRE GAUGE

REG: $1,190.00
SPECIAL: $1.135.00

12" PLANER

EN-PN12
- 2HP 16 AMPS 110V 16,000 CPM
- 2 BLADE CUTTERHEAD
- 26.2 FPM FEED RATE

REG: $380.00
SPECIAL: $355.00

15" PLANER

***EN-PN15**
- 2HP 110/220V 15 AMPS 220V
- 2 SPEEDS, 13,500 CPM
- 3 BLADE CUTTERHEAD
- STAND INCLUDED

PRICE: $795.00

WOOD SHAPER

***EN-WS05**
- 1HP 16 AMPS 110V
- REVERSIBLE MOTOR
- CAST IRON TABLE
- 1/2" SPINDLE

REG: $280.00
SPECIAL: $265.00

HEAVY DUTY WOOD SHAPER

***EN-WS10**
- 3HP 22 AMPS 220V
- 3/4"+1" SPINDLES
- 3" SPINDLE TRAVEL
  (1/2" SPINDLE AVAILABLE)

REG: $860.00
SPECIAL: $845.00

SHIPPING WAREHOUSE/ SERVICE CENTER
12 ARMORY ROAD, CLARKSBURG, WV 26301
HOURS: E.T. MON-FRI 8:00AM- 5:00PM

SHOWROOM/ HEADQUARTERS
19400 E. SAN JOSE AVE.
CITY OF INDUSTRY, CA 91748
TEL: (909) 468-3688 FAX: (909) 468-3689
HOURS: P.T. MON-SAT 8:00 AM-5:00PM

ENLON™

ORDERS 1•800•888•9697

Pacific Time: Mon-Sat 7:00am to 5:00 pm

22" SCROLL SAW

EN-SC22
- 1/8HP MOTOR
- SINGLE SPEED 1,725 SPM
- 22" THROAT, 2" MAX CUT

REG: $150.00
SPECIAL: $145.00

3H.P. DUST COLLECTOR

***EN-DC30**
- 3 HP 220 V 22AMPS
- 1850 CFM
- INTAKE HOLES: 3 @4"

REG: $455.00
SPECIAL: $450.00

16" BAND SAW

***EN-BS16**
- 1-1/2 HP 110/220V 3 SPEEDS
- CAST IRON TABLE
- RIP FENCE & MITRE GAUGE INCLUDED

REG: $520.00
SPECIAL: $490.00

18" HEAVY DUTY BAND SAW
***EN-BS18S**
PRICE: $645.00

18" SUPER HEAVY DUTY BAND SAW

***EN-BS18**
- 2HP 110/220V 11 AMPS 220V
- 3,300 FPM BLADE SPEED
- RIP FENCE & MITRE GAUGE INCLUDED

REG: $910.00
SPECIAL: $880.00

6" X 9" BELT/DISC SANDER

***EN-SN69**
- 3/4 HP 110/220 V
- 6" X 48" BELT,9" DISC
- TABLE TILTS: 0°-45°, BELT: 0°-90°
- WITH GAUGE

REG: $195.00
SPECIAL: $185.00

6" JOINTER

***EN-J006**
- 1HP 110/220V 14 AMPS 110V
- CAST IRON TABLE
- 13,500 CPM
- 3 BLADE CUTTERHEAD

REG: $340.00
SPECIAL: $300.00

8" HEAVY DUTY JOINTER
***EN-J008**
REG: $675.00
SPECIAL: $635.00

VISA

WELCOME TO OUR SHOWROOM
Call for free catalog.
Prices are subject to change without notice.
* F.O.B. CITY OF INDUSTRY, CA or CLARKSBURG, WV

MasterCard